

HAND DELIVERED

JAN 07 2010

UTAH DIVISION OF
SOLID & HAZARDOUS WASTE

2010,00067

**TOOELE CHEMICAL AGENT DISPOSAL FACILITY
(TOCDF)**



**SURROGATE TRIAL BURN PLAN
FOR THE
AREA 10 LIQUID INCINERATOR**

(Fulfilling Requirements of the RCRA, Title V, and MACT Regulations)

Revision 0

January 4, 2010

URS

EG&G Division

**TOOELE CHEMICAL AGENT DISPOSAL
FACILITY (TOCDF)**

**SURROGATE TRIAL BURN PLAN
FOR THE
AREA 10 LIQUID INCINERATOR**

Revision 0

January 4, 2010

EXECUTIVE SUMMARY

The Tooele Chemical Agent Disposal Facility (TOCDF) was designed and built for the United States (U.S.) Army to destroy the chemical munitions stockpile at the Deseret Chemical Depot (DCD), located 20 miles south of Tooele, Utah. EG&G Defense Materials, Inc. (EG&G), operates the TOCDF under contract to the Army through the Chemical Materials Agency.

The U.S. Environmental Protection Agency (EPA) identification number for the TOCDF is UT5210090002. The facility operates under a Resource Conservation and Recovery Act (RCRA) Part B permit, issued pursuant to the delegation of the State of Utah, Department of Environmental Quality (DEQ), Division of Solid and Hazardous Waste (DSHW), under the Utah Administrative Code, Section 315. In addition, the TOCDF also operates under a Title V air permit administered by the State of Utah DEQ, Division of Air Quality (DAQ). Under the requirements of these permits, the incinerator system must demonstrate the ability to effectively treat any hazardous wastes such that human health and the environment are protected.

This plan addresses the testing to be conducted for the Area 10 Liquid Incinerator (ATLIC) as a combined: 1) Surrogate Trial Burn (STB) to fulfill the trial burn requirements of the RCRA permit for Agent GA and Lewisite processing; and 2) Comprehensive Performance Test to fulfill the air permit requirements of 40 CFR 63, Subpart EEE [i.e., Hazardous Waste Combustors (HWC) Maximum Achievable Control Technology (MACT) regulations]. A surrogate mixture containing chlorobenzene (MCB) and tetrachloroethene (TCE) will be used to establish the Destruction and Removal Efficiency (DRE) for the ATLIC. The MCB is a Class 1 compound on the EPA ranking system for difficulty of incineration. Therefore, any other Class 1 compound, and any compound ranked less than a Class 1, may be processed subsequent to the STB. The TCE is a Class 2 compound and their use is a conservative demonstration since Agent GA and Lewisite are estimated to be Class 4 or 5 compounds. This test will also fulfill the Title V air permit condition to test the particulate matter (PM) and carbon monoxide (CO) emissions. Test results will demonstrate compliance with the performance standards specified in the RCRA Permit and the HWC Final Replacement standards for new sources that were published in the Federal Register, October 12, 2005 and finalized in October 2008.

The ATLIC STB will be conducted at one set of operating conditions using a surrogate mixture containing arsenic, lead, and mercury. The spent decontamination solution will be simulated with a solution containing sodium hydroxide and sodium chloride to increase the ash load to the pollution abatement system. The STB will demonstrate minimum temperatures in the Primary and Secondary Combustion Chambers, while demonstrating maximum feed rates and maximum exhaust gas flow rates. The exhaust gas samples collected will be for oxygen, CO, carbon dioxide, PM, hydrogen chloride, chlorine, metals, volatile organic compounds, polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans, nitrogen oxides, and total hydrocarbons. The results of this STB will establish the DRE, chlorine feed rate, and total waste feed rate.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1
TABLE OF CONTENTS	i
LIST OF APPENDICES	iv
LIST OF TABLES	v
LIST OF ACRONYMS AND ABBREVIATIONS	vi
LIST OF UNITS AND MEASUREMENTS	ix
LIST OF CHEMICAL SYMBOLS AND FORMULAS	x
LIST OF IDENTIFICATION CODES FOR LIQUID INCINERATOR INSTRUMENTS MONITORING REGULATED OPERATING PARAMETERS	xi
1.0 INTRODUCTION	1
1.1 ATLIC SURROGATE TRIAL BURN PLAN ORGANIZATION	3
1.2 FACILITY INFORMATION	3
1.3 WASTE TREATMENT SYSTEM PROCESS AND FEED DESCRIPTIONS	4
1.3.1 Waste Handling and Storage	4
1.3.2 Liquid Incinerator System	5
1.3.3 Pollution Abatement System	6
1.4 WASTES TO BE TREATED	6
1.4.1 Worst Case Demonstration by the Surrogate Mixture	6
1.4.2 Normal Wastes Treated	7
1.5 SURROGATE TRIAL BURN OBJECTIVES	7
1.6 SURROGATE TRIAL BURN APPROACH	11
1.7 PROPOSED SURROGATE TRIAL BURN PROGRAM	11
1.8 SURROGATE TRIAL BURN SAMPLING AND ANALYTICAL PROTOCOLS	12
1.9 FINAL PERMIT LIMITS	13
1.10 JUSTIFICATION FOR EXEMPTION	13
2.0 DETAILED ENGINEERING DESCRIPTION OF THE ATLIC	14
2.1 PRIMARY COMBUSTION CHAMBER	14
2.2 SECONDARY COMBUSTION CHAMBER	15
2.3 DESCRIPTION OF THE WASTE FEED NOZZLES AND GAS BURNERS	16
2.4 DESCRIPTION OF THE AUXILIARY FUEL SYSTEM	16
2.5 AGENT TC RINSE AND DRAIN SYSTEM	17
2.5.1 Agent G-1 TC Rinse and Drain System	17
2.5.2 Lewisite TC Rinse and Drain System	18
2.5.3 Transparency TCs Decontamination System	19
2.6 DESCRIPTION OF THE WASTE FEED SYSTEMS	19
2.6.1 PCC Feed System	19
2.6.2 SCC Feed System	20
2.7 HEATING, VENTILATION AND COOLING SYSTEM	21
2.8 DESCRIPTION OF THE AUTOMATIC WASTE FEED CUTOFF SYSTEM	22

TABLE OF CONTENTS (continued)

2.9 EXHAUST GAS MONITORING EQUIPMENT	25
2.9.1 Carbon Monoxide Monitors	26
2.9.2 Oxygen Monitors	26
2.9.3 NO _x Monitors	27
2.9.4 Agent Monitoring Systems	28
2.10 POLLUTION ABATEMENT SYSTEM	28
2.10.1 Quench Tower	29
2.10.2 Packed Bed Scrubber System/Brine Chiller System	29
2.10.3 High-Energy Venturi Scrubber Moisture Separator	30
2.10.4 Exhaust Gas Electric Reheater	30
2.10.5 Powdered Activated Carbon Injection System	31
2.10.6 Baghouse	31
2.10.7 Carbon Filter System	32
2.10.8 ID Fan	32
2.10.9 Exhaust Stack	32
2.11 CONSTRUCTION MATERIALS	32
2.12 LOCATION AND DESCRIPTION OF TEMPERATURE, PRESSURE, AND FLOW INDICATING AND CONTROL DEVICES	33
2.12.1 Facility Control System	34
2.12.2 PCC Agent Feed Rate Control	36
2.12.3 PCC Pressure Control	36
2.12.4 PCC Exhaust Gas Temperature and Burner Controls	36
2.12.5 SCC Exhaust Gas Temperature and Burner Control	37
2.12.6 SCC Spent Decon Waste Feed Control	37
2.12.7 Quench Brine Flow	37
2.12.8 Venturi Scrubber Water Flow	37
2.12.9 Brine pH	37
2.12.10 Venturi Scrubber Differential Pressure	38
2.12.11 Scrubber Tower Sump Level Control	38
2.12.12 Baghouse Pressure Drop	38
2.12.13 Carbon Filter System Differential Pressure Control	38
2.12.14 ATLIC Exhaust Gas Oxygen Concentration	39
2.12.15 ATLIC Exhaust Gas Carbon Monoxide Concentration	39
2.12.16 ATLIC Exhaust Gas Flow Rate	39
2.12.17 Uninterruptable Power Supply System	39
2.13 INCINERATION SYSTEM STARTUP PROCEDURES	39
2.13.1 Startup of the ATLIC Pollution Abatement System	40
2.13.2 Startup of the PCC/SCC	40
2.13.3 Initiation of Primary Waste Feed	41
2.13.4 Initiation of Spent Decon Feed	41
2.14 EMERGENCY PLANNED SHUTDOWNS	42

TABLE OF CONTENTS (continued)

3.0 SAMPLING AND ANALYSIS PROCEDURES.....	43
3.1 SAMPLING LOCATIONS.....	43
3.2 SAMPLING METHODS.....	45
3.3 ANALYSIS METHODS.....	46
4.0 ATLIC SURROGATE TRIAL BURN SCHEDULE.....	48
5.0 ATLIC SURROGATE TRIAL BURN PROTOCOLS.....	49
5.1 WASTE CHARACTERIZATION.....	49
5.1.1 <i>Surrogate Mixture Feed</i>	49
5.1.2 <i>Spent Decontamination Solution Waste Feed</i>	49
5.2 PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT SELECTION RATIONALE.....	51
5.3 TEST PROTOCOL AND OPERATING CONDITIONS.....	51
5.3.1 <i>Development of Worst-Case Criteria</i>	51
5.3.2 <i>Liquid Incinerator Surrogate Trial Burn Operating Conditions</i>	52
5.4 COMBUSTION TEMPERATURE RANGES.....	52
5.5 WASTE FEED RATES AND QUANTITIES OF WASTES TO BE BURNED.....	53
5.6 EXHAUST GAS VELOCITY INDICATOR.....	54
5.7 AUXILIARY FUEL.....	54
5.8 WASTE FEED ASH CONTENT.....	54
5.9 ORGANIC CHLORINE CONTENT OF THE WASTE FEED.....	55
5.10 METALS FEED RATES.....	55
5.11 POLLUTION CONTROL EQUIPMENT OPERATIONS.....	55
5.12 SHUTDOWN PROCEDURES.....	55
5.13 INCINERATOR PERFORMANCE.....	57
6.0 ATLIC STB SHAKEDOWN PROCEDURES.....	59
6.1 STARTUP PROCEDURES.....	59
6.2 ATLIC SHAKEDOWN.....	60
6.3 POST ATLIC SURROGATE TRIAL BURN OPERATION.....	60
6.4 INCINERATOR PERFORMANCE.....	61
7.0 ATLIC SURROGATE TRIAL BURN SUBSTITUTE SUBMISSIONS.....	62
8.0 ATLIC SURROGATE TRIAL BURN RESULTS.....	63
9.0 FINAL OPERATING LIMITS.....	64
9.1 ESTABLISHING LIQUID INCINERATOR OPERATING PARAMETERS.....	64
9.2 GROUP A PARAMETERS.....	65
9.3 GROUP B PARAMETERS.....	66
9.4 GROUP C PARAMETERS.....	66
10.0 REFERENCES.....	68

LIST OF APPENDICES

APPENDIX A.	ATLIC STB QUALITY ASSURANCE PROJECT PLAN
APPENDIX B.	ATLIC STB SHAKEDOWN PLAN
APPENDIX C.	MASS AND ENERGY BALANCE FOR THE AREA 10 LIQUID INCINERATOR SURROGATE TRIAL BURN AND EXHAUST GAS RESIDENCE TIME CALCULATIONS
APPENDIX D.	AUTOMATIC WASTE FEED CUTOFF TABLES AND OPERATING CONDITION TARGET VALUE TABLES FOR THE AREA 10 LIQUID INCINERATOR

LIST OF TABLES

1-1	Agent GA Characterization Summary	8
1-2	Lewisite Characterization Summary	9
1-3	Spent Decontamination Solution Characterization Summary	10
2-1	Area 10 Liquid Incinerator Construction Materials	33
2-2	Instruments Calibration Frequency	35
3-1	ATLIC Exhaust Gas Sampling Summary	44
5-1	Surrogate Mixture Composition and Calculated Feed Rates	50
5-2	Waste Feed Requirements	53
5-3	Estimated Metals Emission Rates	56

LIST OF ACRONYMS AND ABBREVIATIONS

ACAMS	Automatic Continuous Air Monitoring System
AHU	Air Handling Unit
ASTM	ASTM International
ATB	Agent Trial Burn
ATLIC	Area 10 Liquid Incinerator
AWFCO	Automatic Waste Feed Cutoff
BMS	Burner Management System
Brine	Wet Scrubber Recirculation Brine
CAL	Chemical Assessment Laboratory
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CMA	Chemical Materials Agency
CON	Control Room
CPT	Comprehensive Performance Test
DAAMS	Depot Area Air Monitoring System
DAQ	Department of Environmental Quality (State of Utah), Division of Air Quality
DCD	Deseret Chemical Depot
DEQ	State of Utah, Department of Environmental Quality
DFS	Deactivation Furnace System
DI	Deionized (as in deionized water)
DRE	Destruction and Removal Efficiency
DSHW	State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste
EG&G	EG&G Defense Materials, Inc.
EPA	U.S. Environmental Protection Agency
E-stop	Emergency Stop
ETL	Extreme Temperature Limit
FCS	Facility Control System
FSSS	Flame Safety Shutdown System
GC	Gas Chromatograph
GC/MS	Gas Chromatograph/Mass Spectrometer
HAP	Hazardous Air Pollutant
HEPA	High Efficiency Particulate Air
HHRA	Human Health Risk Assessment
HRGC/HRMS	High Resolution Gas Chromatograph/High Resolution Mass Spectrometer

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

HVAC	Heating, Ventilation, and Cooling
HWC	Hazardous Waste Combustor
HRA	Hourly Rolling Average
IC	Ion Chromatography
ICP/MS	<i>Inductively Coupled Plasma/Mass Spectrometry</i>
ID	Induced Draft
LIC	Liquid Incinerator
LOQ	Limit of Quantitation
MACT	Maximum Achievable Control Technology
MEB	Mass and Energy Balances
MPF	Metal Parts Furnace
NDIR	Non-Dispersive Infrared
NOC	Notifications of Compliance
NRT	Near Real Time
OPI	Operating Parameter Limits
PAC	Powdered Activated Carbon
PAS	Pollution Abatement System
PCC	Primary Combustion Chamber
PICs	Products of Incomplete Combustion
P&ID	Piping and Instrument Diagram
PLC	Programmable Logic Controller
PM	Particulate Matter
POHC	Principal Organic Hazardous Constituent
PSI	Performance Specification Test
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SCC	Secondary Combustion Chamber
SDS	Spent Decontamination System
SMVOC	Sampling Method for Volatile Organic Compounds
Spent Decon	Spent Decontamination Solution
STB	Surrogate Trial Burn
SVOC	Semi-Volatile Organic Compound
SW-846	Test Methods for Evaluating Solid Waste, 3rd Edition including Update IV, USEPA, SW-846, December 1996.
TC	Ton Container
TE-LOP	Tooele Laboratory Operating Procedure

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

TEQ	Toxic Equivalent Concentration
THC	Total Hydrocarbons
TOCDF	Tooele Chemical Agent Disposal Facility
TSCA	Toxic Substances Control Act
TSDf	<i>Treatment Storage and Disposal Facility</i>
UPS	Uninterruptible Power Supply
U.S.	United States
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound
WCL	Waste Control Limit
XSD	Halogen Specific Detector

LIST OF UNITS AND MEASUREMENTS

acfm	actual cubic feet per minute
Btu/hr	British thermal units per hour
Btu/lb	British thermal units per pound
cP	centiPoise
cfm	cubic feet per minute
°C	degree centigrade
°F	degree Fahrenheit
dscf	dry standard cubic foot
dscfm	dry standard cubic feet per minute
dscm	dry standard cubic meter
ft	foot
ft ³	cubic foot
g	gram
g/sec	grams per second
gal	gallon
gpm	gallons per minute
gr/dscf	grains per dry standard cubic foot (1 atmosphere, 68 °F)
hp	horsepower
inHg	inches of mercury
inWC	inches of water column
L	liter
L/m	liters per minute
lb/ft ³	pounds per cubic foot
µg	microgram
m	cubic meter
mg	milligram
mL	milliliter
N	Normal
ng	nanogram
ppb	parts per billion
ppm	parts per million
ppmdv	parts per million on a dry volume basis
lb/hr	pounds per hour
psi	pounds per square inch
psig	pounds per square inch gauge
scfm	standard cubic feet per minute
ΔP	pitot velocity pressure
Wt%	weight percent

LIST OF CHEMICAL SYMBOLS AND FORMULAS

Agent GA	Ethyl N,N-dimethyl phosphoroamidocyanidate
Al	aluminum
Ag	silver
As	arsenic
B	boron
Ba	barium
Be	beryllium
Cd	cadmium
Cl ₂	chlorine
CO ₂	carbon dioxide
CO	carbon monoxide
Co	cobalt
Cr	chromium
Cu	copper
EDT	ethanedithiol
HNO ₃	nitric acid
Hg	mercury
HCl	hydrogen chloride
H ₂ O ₂	hydrogen Peroxide
L	Lewisite or (2-chlorovinyl) dichloroarsine
KMnO ₄	potassium permanganate
MCB	Chlorobenzene
Mn	manganese
NaOH	sodium hydroxide
H ₂ SO ₄	sulfuric acid
Ni	nickel
NO _x	nitrogen oxides
O ₂	oxygen
P	phosphorus
Pb	lead
PCE	perchloroethylene or tetrachloroethene
PCDD	polychlorinated dibenzo-p-dioxin
PCDF	polychlorinated dibenzofurans
Sb	antimony
Se	<i>selenium</i>
Sn	tin
TCDD	tetrachlorodibenzo-p-dioxin
Tl	thallium
V	vanadium
Zn	zinc

LIST OF IDENTIFICATION CODES FOR LIQUID INCINERATOR INSTRUMENTS MONITORING REGULATED OPERATING PARAMETERS

815-TIC-8471	Primary Chamber Exhaust Gas Temperature
807-FIT-8430	Primary Chamber Agent Feed Rate, Hourly Rolling Average
822-PI-8410	Agent Atomizing Air Pressure
815-TIC-8570	Secondary Chamber Temperature
815-TIT-8571	Secondary Chamber Exhaust Gas Temperature
829-FIT-8521	Secondary Chamber SDS Feed Rate, Hourly Rolling Average
822-PI-8511	Spent Decon Atomizing Air Pressure
819-FIT-9824	Venturi Scrubber Brine Feed, Hourly Rolling Average
819-PI-8961	Quench Brine Delivery Pressure
819-FIT-8921	Brine Flow to Scrubber Tower #1, Hourly Rolling Average
819-FIT-8922	Brine Flow to Scrubber Tower #2, Hourly Rolling Average
819-FIT-8923	Brine Flow to Scrubber Tower #3, Hourly Rolling Average
819-PDI-8911	Scrubber #1 Pressure Drop
819-PDI-8912	Scrubber #2 Pressure Drop
819-PDI-8913	Scrubber #3 Pressure Drop
819-PI-8982	Scrubber Brine Pump Pressure
819-FI-8924	Brine to Venturi Scrubber Flow
819-AI-8983	Scrubber Brine Density, 12-hr Rolling Average
819-AIT-8952	Brine pH, Hourly Rolling Average
819-PDI-8915	Venturi Exhaust Gas Pressure Drop
819-PI-8956	Venturi Pump Pressure
819-TIT-8931	Baghouse Inlet Temperature
819-PDIT-8936	Baghouse Differential Pressure
819-AI-8983	Carbon Injection Feed Weight
819-WI-8933	Carbon Injection Feed Weight
819-FI-8934	Carbon Injection Air Flow
819-PDI-8941 /8942	Carbon Filter Differential Pressure
819-TI-8939	Carbon Filter Inlet Temperature
819-FIT-8934	Carbon Injection Feed
819-FI-8932	Exhaust Gas Flow Rate (Unit Production Rate)
819-AIT-8302	Blower Exhaust CO Concentration
819-AAL-8301	Blower Exhaust Gas O ₂
819-AIC-917	Venturi Sump pH, HRA
819-AI-8927	Venturi Sump Density, 12-hr Rolling Average

1.0 INTRODUCTION

The Tooele Chemical Agent Disposal Facility (TOCDF) is a hazardous waste disposal facility that was designed and built for the United States (U.S.) Army for the destruction of the chemical agent munitions stockpile at the Deseret Chemical Depot (DCD), located 20 miles south of Tooele, Utah. EG&G Defense Materials, Inc., (EG&G) operates the TOCDF under contract to the Army through the Chemical Materials Agency (CMA). The TOCDF is designed to dispose of chemical Agents GB, VX, and mustard (H-series), drained munitions, contaminated refuse, bulk containers, liquid wastes, explosives, and propellant components. The planned eventual closure of the DCD necessitates the destruction of the final remains of two additional agents, Agent GA and the blister agent Lewisite, to complete the destruction of chemical agents in storage at DCD. The destruction of these additional chemical agents has been contracted to EG&G by the CMA, and the destruction activities will be conducted in DCD Area 10 in a newly-constructed incinerator.

The U.S. Environmental Protection Agency (EPA) identification number for the TOCDF is UT5210090002. The facility operates under a Resource Conservation and Recovery Act (RCRA) Part B Permit, issued pursuant to the delegation of the State of Utah, Department of Environmental Quality (DEQ), Division of Solid & Hazardous Waste (DSHW), under the Utah Administrative Code, Section 315 (R315). The TOCDF also operates under a Title V air permit administered by the State of Utah, DEQ, Division of Air Quality (DAQ). These permits are being modified to include processing Agent GA and Lewisite in the new incinerator. To fulfill the requirements of these permits, a demonstration of the newly-installed Area 10 Liquid Incinerator's (ATLIC) ability to effectively treat any hazardous waste such that human health and the environment are protected will be conducted. This testing will meet the requirements of a Comprehensive Performance Test (CPT) to meet the Title V and Hazardous Waste Combustors (HWC) Maximum Achievable Control Technology (MACT) requirements. The EPA promulgated Replacement HWC MACT Standards for HWCs on 12 October 2005, and they were finalized in October 2008.

This plan describes the fifth incinerator system that TOCDF operates to dispose of the chemical agents stored at DCD. The five incinerators include the two liquid incinerators (LIC1 and LIC2), the Metal Parts Furnace (MPF), the Deactivation Furnace System (DFS), and the new ATLIC. Agent Trial Burns (ATBs) have been conducted in the other incinerator systems at the beginning of each new campaign, and similar testing will be conducted in the ATLIC prior to processing Agent GA and Lewisite. This plan describes how TOCDF intends to use surrogate chemicals to demonstrate the combustion of hazardous chemicals in a combined Surrogate Trial Burn (STB) and CPT in the ATLIC, which will be referred to as the ATLIC STB. (The follow-on ATLIC Lewisite CPT will demonstrate the processing of increased concentrations of arsenic and mercury present in the Lewisite and will be addressed in a separate plan. This plan also serves as the notification that TOCDF plans to conduct a CPT for the ATLIC. The feed rates, exhaust gas

flow rates, flows and temperatures demonstrated during the ATLIC STB will be used to set limits and operating parameters when the testing is completed.

The ATLIC will consist of a small-scale liquid incinerator, approximately one-third the size of the existing TOCDF LIC's. In order to remain compliant with all state and federal air rules and regulations while processing these remaining agents, a Pollution Abatement System (PAS) with enhanced capabilities from those of the existing PAS at TOCDF will be constructed to control air emissions. The new PAS will have additional capabilities for mercury and arsenic removal since it is known that Lewisite TCs have a high amount of mercury and arsenic in the agents. Agent GA monitoring on the ATLIC and PAS will be with Automatic Continuous Air Monitoring Systems (ACAMS) and Depot Area Air Monitoring Systems (DAAMS), while the Lewisite will be monitored with two MINICAMS with two different columns. The incinerator will undergo performance testing as required by the HWC MACI regulations to demonstrate compliance with the National Emission Standards for Hazardous Air Pollutants as seen in Title 40, Code of Federal Regulations, Part 63, Subpart EEE (40 CFR 63.1219) for new sources.

The ton containers (TCs) to be processed at the ATLIC include 4 TCs containing approximately 4,000 pounds (lb) of Agent GA (Ethyl N,N-dimethyl phosphoramidocyanidate) and 10 TCs containing approximately 26,000 lb of Lewisite [(2-chlorovinyl) dichloroarsine] that are currently being stored at the DCD. In order to destroy these TCs without impacting the completion schedule in regards to the Chemical Weapons Convention treaty, a new facility will be constructed in Area 10 that will work in parallel with TOCDF. There are also ten TCs (known as "transparency tons") that were found to be empty with low concentrations of Volatile Organic Compounds (VOCs) in the headspaces. The transparency tons do not contain any appreciable materials and the liquid levels were so low that samples could not be obtained.

This STB plan will describe how TOCDF will:

- Demonstrate with the use of surrogate chemicals that chemical agents can be destroyed in accordance with the RCRA requirements outlined in 40 CFR 264.343 and the Utah Administrative Code, R315-8-15.
- Use sampling and analysis methods from Test Methods for Evaluating Solid Waste (SW-846) (1), 40 CFR 60, Appendix A (2), and Tooele Laboratory Operating Procedures (TE-LOPs) to measure that the emissions from the ATLIC to meet the required standards.

A separate Continuous Emissions Monitoring System (CEMS) performance evaluation is conducted annually for the ATLIC CEMS as directed by Attachment 20 to the TOCDF Permit (3). The ATLIC STB Plan was developed using the EPA guidance in the "Hazardous Waste Combustion Unit Permitting Manual" (4). In addition, this plan is submitted as a RCRA Permit modification for the treatment of Agent GA and Lewisite in the ATLIC. Regulatory reference citations are given, as appropriate, throughout this STB plan.

1.1 ATLIC SURROGATE TRIAL BURN PLAN ORGANIZATION

This plan is a stand-alone document to allow a separate review from that of the modifications to the TOCDF Permits. The plan describes the operating conditions for the testing and the samples to be collected as part of the ATLIC STB. The Quality Assurance Project Plan (QAPP) (Appendix A) describes the sampling and analyses to be conducted. Appendix B contains the ATLIC Shakedown Plan for the period prior to the ATLIC STB. The Mass and Energy Balances (MEBs) are found in Appendix C. The Automatic Waste Feed Cutoffs (AWFCOs) are summarized in separate tables for the ATLIC in Appendix D. A summary of the Agent GA and Lewisite characterization data are located in the Supporting Information to the Permit Modification in Attachment 3 and Attachment 4 contains the referenced drawings for the ATLIC.

This introduction provides an overview of the plan, including:

- Process descriptions;
- Waste feed descriptions;
- STB objectives;
- STB approach;
- STB program;
- STB protocol; and
- Expected final permit conditions resulting from the STB.

1.2 FACILITY INFORMATION

The TOCDF is located in EPA Region 8. The TOCDF EPA Identification Number is UT5210090002, which is also the DSHW permit number. The DCD Title V Operating Permit Number is 4500071001.

The ATLIC STB points of contact are:

Thaddeus A. Ryba, Jr., TOCDF Site Project Manager
11620 Stark Road
Stockton, UT 84071
(435) 833-7439

Mr. Gary McCloskey, Vice President and TOCDF General Manager
EG&G Defense Materials, Inc.
11600 Stark Road
Stockton, UT 84071
(435) 882-5803

Mr. Larry Williams, ATLIC STB Test Director
FG&G Defense Materials, Inc.
11600 Stark Road
Stockton, UT 84071
(435) 882-5803

1.3 WASTE TREATMENT SYSTEM PROCESS AND FEED DESCRIPTIONS

The ATLIC is located in DCD Area 10, and its operation is not affected by other operations taking place at TOCDF during the STB. An overview of the facility is provided in the Supporting Information to the Permit Modification in Attachment 4 the facility site plan, Drawing TE-16-C-2. The ATLIC has a Primary Combustion Chamber (PCC) for agent incineration followed by a Secondary Combustion Chamber (SCC). The SCC primarily incinerates spent decontamination solution (spent decon), but also provides additional residence time for PCC exhaust gases. Exhaust gases from the SCC are then routed to the PAS for removal of air pollutants. Brief descriptions of the major discrete components follow, and a detailed system description is provided in Section 2 of this plan.

1.3.1 Waste Handling and Storage

The demilitarization process begins with the transport of the TCs from their storage site at DCD Area 10 to the ATLIC for processing. Ton containers are moved from Area 10 storage igloos and then placed in a glove box. The Agent GA drained from the TCs is pumped to the PCC directly, while the Lewisite will be pumped to an agent collection tank before being fed to the ATLIC. Any residual Agent GA in the TCs is destroyed by sodium hydroxide (NaOH) that is added to the TC, and the TC is then rotated. Lewisite remaining in the TCs is destroyed by the addition of nitric acid that also dissolves the solid residue in the TCs. After treatment by the primary decontamination chemical, the TCs are rinsed three times and a sample of the rinse is analyzed for agent. If the agent is below the Waste Control Limit (WCL), then the TC is examined and sent to a Subtitle C Treatment Storage and Disposal Facility (TSDF). If the agent is above the WCL, then the decontamination treatment is repeated followed by three more rinses. The rinse water is drained and sent to the Spent Decontamination System (SDS) collection tank.

During the demilitarization process, the facility generates spent decon, which is collected by the SDS and stored in the SDS collection tank until processed in the SCC. Each tank is sampled after it has been filled and analyzed for agent and the Human Health Risk Assessment (HHRA) metals. If the sample meets the treatment completion criteria, the spent decon is pumped through two spray nozzles into the SCC.

Acid gases generated during combustion are removed from the exhaust gases by the PAS. The Wet Scrubber Recirculation Brine (Brine) removes the acid gases. The Brine removed from the PAS is stored in tanks until it is shipped off-site for disposal.

1.3.2 Liquid Incinerator System

The ATLIC was custom designed and hence has no model designation. The ATLIC will be comprised of a two chamber, refractory-lined furnace and associated subsystems. The ATLIC will destroy the surrogate chemicals, Agent GA, Lewisite, and spent decon through high-temperature incineration. The PCC was designed to treat the surrogate chemicals, Agent GA, and Lewisite, while the SCC was designed to process spent decon.

The ATLIC will be controlled by the Facility Control System (FCS), which will be responsible to safely and efficiently monitor and control the process systems, process support systems, and control systems that are located within the ATLIC. The FCS will be composed of microprocessor-based electronic controllers with the primary function of assisting operations personnel in the safe startup, monitoring, control, data logging, alarming, and planned shutdown of the facility. The FCS will consist of hardware including operator and engineer workstations, and system software and development tools for system control, data collection, data storage, report generation, and programming. Operation of the FCS will be conducted from a central Control Room (CON) located near the ATLIC.

The PCC hot face will be lined with SR-90 alumina brick. The PCC temperature will be maintained by a 3,000,000 British thermal units/hour (Btu/hr) natural gas fired burner allowing a maximum feed rate of approximately 200 pounds per hour (lb/hr) for Agent GA and approximately 300 lb/hr Lewisite. A liquid waste nozzle will be mounted next to the burner and angled towards the burner so that material fed through the waste nozzle mix with the hot burner gases. The PCC temperature will be maintained above 2,550 °F for processing of all wastes. The ATLIC will operate with a minimum 3-seconds overall system gas residence time through the PCC and SCC (the exhaust duct leading to the PAS from the SCC is not included). There will be an adjustable-speed induced draft (ID) fan associated with the ATLIC. The ID fan, using negative pressure, will move the exhaust gases from the PCC directly into the SCC, and on through the PAS for scrubbing and filtration. The exhaust gases will then exit the PAS, enter the fan and exit the exhaust stack into the atmosphere.

The SCC hot face will be lined with Ruby SR Brick and the temperature will be maintained by a 1,000,000 Btu/hr natural gas fired burner. The gases entering the secondary chamber from the primary chamber are cooled by injection of water or spent decon through two air-atomized nozzles located next to the burner. The nozzles will be capable of flows up to 2 gallons per minute (gpm). The nominal flow rate through the nozzles during normal operations will be 0.8 gpm. The SCC will be maintained above 1,850 °F for processing of all wastes.

An enclosure will be added to Igloo 1639 in Area 10 to house the new incinerator and associated PAS. Utilities required by the ATLIC include fuel gas, electric power, plant air, process water, and instrument air. See Attachment 4 to the permit modification for a detailed drawing that includes both chambers of the ATLIC and the PAS.

1.3.3 Pollution Abatement System

The PAS is designed to cool the exhaust gas exiting the SCC at approximately 2,000 °F to approximately 70 °F at the exit of the condenser/absorber before it is heated to 180 °F before going through the baghouse and carbon filter. The PAS will remove pollutants such as particulate matter (PM), acid gases, and metals from the exhaust gas to below regulatory standards prior to being released to the atmosphere. Additional filtration for mercury removal is also part of the PAS design. The PAS will be in operation at all times that the ATLIC is operating, including startup and at idle with no waste in the furnace.

The PAS equipment will consist of a quench tower, a series of packed bed scrubbers, a high-energy venturi scrubber with a manually adjusted throat, a moisture separator, a Brine chiller, an electric gas reheater, a powdered activated carbon (PAC) injection system, a baghouse, a sulfur-impregnated carbon filter system, an induced draft fan, and an exhaust stack. A description of each piece of equipment and its function in the PAS can be found in Section 2.10.

1.4 WASTES TO BE TREATED

The ATLIC will destroy the surrogate chemicals, Agent GA, Lewisite, and spent decon through high-temperature incineration. The PCC is designed to treat the surrogate mixture, Agent GA, and Lewisite, while the SCC is designed to process spent decon.

The State of Utah has defined chemical agents as acutely hazardous and identified them as P999 (i.e., chemical agent) waste along with any items contaminated by chemical agent. However, the ATLIC will not produce or handle any liquids containing polychlorinated biphenyls (PCBs) that would be regulated under the Toxic Substances Control Act (TSCA), or treat any waste materials with dioxin waste codes (i.e. F020, F021, F022, F023, F026, or F027).

1.4.1 Worst Case Demonstration by the Surrogate Mixture

A surrogate mixture will be fed to the ATLIC during the shakedown period and the STB, and the details for the surrogate solution are discussed in Sections 5.1.1 and 5.3.1. Metals will be spiked into the surrogate mixture to provide a test for metals emissions that will support the processing of Agent GA. Arsenic, lead, and mercury will be added to the mixture in a form that is soluble in the organic compounds. The compounds in the surrogate mixture are classified as Hazardous Air Pollutants (HAPs) by EPA. As a part of this test, a Destruction and Removal Efficiency (DRE) will be measured for the Principal Organic Hazardous Constituents (POHCs) in the surrogate mixture, which are chlorobenzene and tetrachloroethene. The surrogate mixture will contain chlorobenzene that is rated as a Class 1 compound in the EPA incineration ranking system, which demonstrates a DRE for any other Class 1 compound and any other compound that is ranked lower than that by the EPA system (5). A DRE will be demonstrated for

chlorobenzene and tetrachloroethene. Agent GA and Lewisite will not have a DRE measured since they are estimated to rank as a Class 4 or 5 compound (5).

The spent decon used for the STB will be a prepared solution that is 2.0 Weight Percent (Wt%) sodium hydroxide and 10.0 Wt% sodium chloride to simulate the ash loading to the PAS that will be encountered during the processing of Agent GA. (See Section 5.8 for the discussion on ash loading.)

1.4.2 Normal Wastes Treated

The DREs established for the surrogates will allow the ATLIC to process Agent GA and Lewisite wastes. Table 1-1 shows the composition of the four TCs with Agent GA as determined by a study conducted in 2009 (6) with a copy supplied in Attachment 3 to the permit modification. Chlorobenzene is listed in Table 1-1 as a constituent of the Agent GA wastes, but it will be treated at a lower feed rate than demonstrated in the ATLIC STB. Table 1-2 shows the composition of the Lewisite from the 2009 study (6). Both of these tables show that the DREs for the surrogates are a conservative demonstration for the actual compounds treated by the normal operations of the ATLIC.

Spent decon will be composed of a mixture of sodium hydroxide, used to decon equipment, and surfactants, used to decon personnel. It will be treated in the SCC and will vary in concentration, but will always be below 5 % organic compound concentrations. Spent decon will have an agent concentration that is less than (<) the WCL, which is 20 parts per billion (ppb) for Agent GA and 200 ppb for Lewisite, before it can be treated in the SCC. During the shakedown and STB, the spent decon will not be analyzed for agent because no agent will have been introduced into the system until after the STB. Table 1-3 summarized the composition of the spent decon.

1.5 SURROGATE TRIAL BURN OBJECTIVES

The objectives for the ATLIC STB are to demonstrate:

- A maximum surrogate mixture feed rate on an Hourly Rolling Average (HRA) basis, while maintaining a DRE \geq 99.99 % for the designated POHCs, chlorobenzene and tetrachloroethene.
- Control of carbon monoxide (CO) emissions to $<$ 100 parts per million dry volume (ppmdv), corrected to 7 percent oxygen ($@$ 7 % O₂), on an HRA basis.
- That PM emissions are $<$ 0.0016 grains/dry standard cubic foot (gr/dscf) $@$ 7 % O₂ (MACT limit).

TABLE 1-1. AGENT GA CHARACTERIZATION SUMMARY

Organic Compounds	D25253	D29813	D35248	D51365	Average
Ethyl N,N-dimethylphosphoroamidocyanide (GA) (Wt%)	38.8	21.1	26.6	19.8	26.6
Triethylphosphate (Area %)	< 1.0	1.0	< 1.0	< 1.0	< 1.0
Ethyl methyl N,N-dimethylphosphoroamidate (Area %)	2.0	< 1.0	8.0	7.0	5.7
Dimethyl dimethylphosphoramidate (Area %)	< 1.0	< 1.0	1.0	1.0	< 1.0
N,N-Dimethyl O,O'-diethyl phosphoramidate (Area %)	10	10	20	20	15.0
bis (N,N-dimethyl) O-ethyl phosphorodiamidate (Area %)	0.5	6.0	8.0	9.0	5.9
Tetramethyl phosphorocyanidic diamide (Area %)	8.0	7.0	10.0	11.0	9.0
Chlorobenzene (Wt%)	4.09	11.6	13.1	10.7	9.87
Metals					
Aluminum (mg/kg)	34.9	40.3	30.3	37.3	35.7
Antimony (mg/kg)	0.52	0.23	334	316	162.7
Arsenic (mg/kg)	32.7	29.8	49.6	32.9	36.3
Barium (mg/kg)	1.06	0.62	0.39	0.36	0.6
Beryllium (mg/kg)	< 0.05	0.05	0.05	0.05	0.1
Boron (mg/kg)	109	112	113	95.6	107.4
Cadmium (mg/kg)	< 0.05	0.05	0.05	0.05	0.1
Chromium (mg/kg)	2.13	2.57	1.25	1.29	1.8
Cobalt (mg/kg)	< 0.05	0.05	0.05	0.05	0.1
Copper (mg/kg)	21.6	10.3	0.82	1.72	8.6
Lead (mg/kg)	18.4	18.7	0.27	0.77	9.5
Manganese (mg/kg)	1.25	1.32	0.13	0.21	0.7
Mercury (mg/kg)	4.1	0.49	10.4	1.81	4.2
Nickel (mg/kg)	0.68	0.7	0.09	0.19	0.4
Selenium (mg/kg)	< 0.05	0.05	0.07	0.09	0.1
Silver (mg/kg)	< 0.05	0.05	0.12	0.12	0.1
Thallium (mg/kg)	< 0.05	0.05	0.05	0.05	0.1
Tin (mg/kg)	3.04	0.25	0.27	6.75	2.6
Vanadium (mg/kg)	9.58	11.5	13.9	11	11.5
Zinc (mg/kg)	62.7	43.1	28.3	36.7	42.7

TABLE 1-2. LEWISITE CHARACTERIZATION SUMMARY

	Average	Standard Deviation	Maximum Value	Minimum Value
Compounds (Area %)				
(2-Chlorovinyl) dichloroarsine (Lewisite L1)	76.9	2.1	80.4	74.3
bis (2-Chlorovinyl) chloroarsine (Lewisite L2)	14.9	1.0	16.4	13.0
tris (2-Chlorovinyl)arsine (Lewisite L3)	0.73	0.14	0.99	ND
AsCl ₃	1.3	0.34	1.9	ND
Metals				
Aluminum (mg/kg)	34.3	4.25	44	29.8
Antimony (mg/kg)	313	16.0	338	292
Arsenic (Wt%)	32.1	1.11	33.5	30.5
Barium (mg/kg)	0.376	0.11	0.59	0.16
Beryllium (mg/kg)	< 0.06	ND	0.10	< 0.05
Boron (mg/kg)	98.1	11.0	113	78.8
Cadmium (mg/kg)	< 0.06	ND	0.10	< 0.05
Chromium (mg/kg)	1.34	0.15	1.59	1.17
Cobalt (mg/kg)	< 0.05	ND	< 0.05	< 0.05
Copper (mg/kg)	0.94	0.85	2.35	0.26
Lead (mg/kg)	0.32	0.20	0.87	0.18
Manganese (mg/kg)	0.18	0.07	0.35	0.11
Mercury (mg/kg)	192	136	528	48.4
Nickel (mg/kg)	0.22	0.23	0.84	0.06
Selenium (mg/kg)	< 0.68	2.00	6.36	0.05
Silver (mg/kg)	0.14	0.08	0.35	0.1
Thallium (mg/kg)	< 0.05	ND	< 0.05	< 0.05
Tin (mg/kg)	< 0.39	0.26	0.95	< 0.25
Vanadium (mg/kg)	14.1	1.6	16.9	11.8
Zinc (mg/kg)	44.4	13.2	72	30.8

TABLE 1-3. SPENT DECON CHARACTERIZATION SUMMARY^a

Parameter	Average	Maximum	Minimum
VOCs (mg/L)	ND	ND	ND
SVOCs (mg/L)	ND	ND	ND
PCBs (µg/L)	1.56	1.89	0.80
PCDDs/PCDFs (pg/L) ^b	35.6	43.4	22.4
TOC (g/L)	1.39	1.66	0.69
pH	12.7	12.9	12.6
TSS (g/L)	1.28	4.69	0.032
TDS (g/L)	11.7	15.7	8.36
Aluminum (mg/L)	< 5.0	ND	ND
Antimony (mg/L)	< 0.050	ND	ND
Arsenic (mg/L)	< 0.050	ND	ND
Barium (mg/L)	< 0.12	ND	ND
Beryllium (mg/L)	< 0.050	ND	ND
Boron (mg/L)	< 2.5	ND	ND
Cadmium (mg/L)	< 0.050	ND	ND
Chromium (mg/L)	< 0.12	ND	ND
Cobalt (mg/L)	< 0.12	ND	ND
Copper (mg/L)	0.15	0.17	< 0.12
Lead (mg/L)	0.27	0.33	0.13
Manganese (mg/L)	< 0.12	ND	ND
Mercury (mg/L)	0.0024	0.0031	0.0016
Nickel (mg/L)	0.19	0.24	0.12
Selenium (mg/L)	< 0.050	ND	ND
Silver (mg/L)	< 0.12	ND	ND
Thallium (mg/L)	< 0.025	ND	ND
Tin (mg/L)	< 0.50	ND	ND
Vanadium (mg/L)	< 0.12	ND	ND
Zinc (mg/L)	1.53	1.90	0.91

Notes:

^a Data taken from the LIC HD ATB Report

^b PCDD/PCDF concentrations are in Toxic Equivalent Concentrations to 2,3,7,8-TCDD.

VOC = Volatile Organic Compounds; SVOC = Semi-Volatile Organic Compounds

PCBs = Polychlorinated Biphenyls; TOC = Total Organic Carbon

- That the combined halogen emissions [hydrogen chloride (HCl) and chlorine (Cl₂) gas] are < 21 ppm (MACT) expressed as HCl equivalents, dry basis (@ 7 % O₂).
- That the Polychlorinated Dibenzo-p-dioxin (PCDD) and Polychlorinated Dibenzofuran (PCDF) emissions are < 0.20 nanograms/dscm (ng/dscm) 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) Toxic Equivalent Concentration (TEQ) (@ 7 % O₂).
- The mercury emissions are < 8.1 µg/dscm (@ 7 % O₂ (MACT limit).
- The semi-volatile metals emissions (lead and cadmium) are < 10 µg/dscm (@ 7 % O₂ (MACT limit).
- The low-volatility metals emissions (arsenic, beryllium, and chromium) are < 23 µg/dscm (@ 7 % O₂ (MACT limit).
- The emission rate of nitrogen oxides (NO_x).
- Limitations on waste feed characteristics and process operating conditions in order to ensure compliance with performance standards and risk-based emission limits.
- That the Total Hydrocarbon (THC) emissions are < 10 ppmvd (@ 7 % O₂ over an HRA (monitored continuously with a CEMS), and reported as propane.

1.6 SURROGATE TRIAL BURN APPROACH

It is anticipated that surrogate chemicals and spent decon may be processed simultaneously during the Agent GA and Lewisite Campaign. Maximum waste feed rates for each stream will be demonstrated simultaneously during the ATLIC STB. The incinerator operator will thus have the flexibility to deal with combinations of both wastes while controlling the overall combustion process within specific limits (including temperature, exhaust gas velocity, and thermal duty). The operating parameter limits (OPL) will be set per 40 CFR 63.1209 with a single mode of operation during the STB.

1.7 PROPOSED SURROGATE TRIAL BURN PROGRAM

The ATLIC is operated as a steady state incinerator. The ATLIC STB will be conducted at one test condition established as a worst case condition by feeding the maximum surrogate feed rate with spiking metals into the PCC. The ATLIC temperatures will be maintained within the limits listed in Appendix D. The combustion airflows in the system vary over a small range, and system pressures are maintained negative relative to the ATLIC furnace room. The metals will be part of the surrogate mix to provide a "worst-case" test to support the processing of Agent

GA, thereby setting a fixed metals feed rate for Agent GA processing. Spent decon fed to the SCC has the potential to contain organic compounds that are classified as HAPs by the EPA. As a part of this test, a surrogate HAP (chlorobenzene) will be fed to the PCC and a DRE measured to cover processing HAPs in the ATLIC. Operation of the PAS follows the furnace; hence, fluctuations in the PAS parameters will be limited. Brine pH is controlled at a pH > 7 to remove the acid gases from the exhaust gases, and Brine flows are controlled principally to maintain PAS component liquid levels and temperatures.

1.8 SURROGATE TRIAL BURN SAMPLING AND ANALYTICAL PROTOCOLS

Detailed discussions of the sampling and analysis procedures are provided in the QAPP (Appendix A). The structure of this STB is based on the previously-stated objectives in Section 1.4. The exhaust gas sampling and analytical methods to be used to quantify specific ATLIC STB parameters are taken from SW-846 (1), 40 CFR 60, Appendix A (2), and TOCDF Procedures. These methods are described below:

- The ATLIC CEMS will monitor for CO, O₂, and NO_x on a continuous basis. The CO concentration will be used to demonstrate control of Products of Incomplete Combustion (PICs).
- EPA Methods 1 and 2 (2) will determine traverse sampling locations and flow rates.
- EPA Method 3A (2) will determine carbon dioxide (CO₂) concentrations using a CEMS supplied by the sampling subcontractor.
- Each isokinetic sampling train will determine the moisture content of the exhaust gas.
- EPA Method 5/26 (2) will determine the PM emissions and halogen (HCl and Cl₂) emissions.
- EPA Method 29 (2) will determine the HHRA metals emissions.
- SW-846, Method 0031 (1), will determine (VOC) emissions.
- SW-846, Method 0023A (1), will determine PCDD/PCDF emissions.
- Method 25A (2) will determine the THC using a sampling subcontractor CEMS.

1.9 FINAL PERMIT LIMITS

Anticipated OPLs resulting from this STB are summarized in Appendix D. Process parameters are divided into Group A, B, and C parameters as directed in EPA guidance documents. (The groupings are shown in Section 9.) Group A and B parameters will be established on the basis of ATLIC STB results. Group C parameters are established on the basis of regulatory guidance, process design/safety considerations, or vendor recommendations. The OPLs will be established following the guidance in 40 CFR 63.1209.

Group A parameters will be continuously-monitored process parameters, which will be tied to AWFCOs. Group B parameters do not require continuous monitoring and will not be interlocked with the AWFCO system; however, detailed operating records will be maintained to demonstrate compliance with permitted operating conditions. Some Group C parameters will be continuously monitored and interlocked with the AWFCO system.

Group C parameters will be established independent of STB results. For the most part, their respective limits will be based on engineering considerations and good operating practices. For safety and system performance purposes, the quench tower exit temperature and the differential pressure between atomizing gas and waste feed will be monitored and recorded continuously, and interlocked with the AWFCO system.

During the shakedown period, the AWFCO settings for Group A and interlocked Group C parameters will be those listed in Appendix D. During the STB, the interlocks for these Group A and C parameters will remain operational at the limits noted in Appendix D.

1.10 JUSTIFICATION FOR EXEMPTION

The TOCDF is not seeking an exemption from any of the incinerator or trial burn requirements because the regulatory requirements of 40 CFR 270.19(a) do not apply to the ATLIC.

2.0 DETAILED ENGINEERING DESCRIPTION OF THE ATLIC

This STB plan discusses the requirements of 40 CFR 270.19(b) to conduct a trial burn. This section discusses the current engineering configuration of the ATLIC as required by 40 CFR 270.62(b)(2)(ii). The operating parameters will be established by the STB and included in the final permits. Engineering changes that might be encountered during shakedown would necessitate revisions to this STB plan; any such changes would be coordinated with the DAQ and DSHW.

The ATLIC engineering drawings and specifications were prepared by EG&G. Selected Piping and Instrument Diagrams (P&IDs) and equipment arrangements are provided in the Supplemental Information for the Permit Modification, Attachment 4. Drawings EG-22-F-8201, Sheet 1, and EG-22-F-8202, Sheet 1 show a simplified process flow diagram (see Attachment 4).

2.1 PRIMARY COMBUSTION CHAMBER

The ATLIC is a controlled-air, direct-fired, liquid-injection incinerator with a PCC and a SCC. The vessels are refractory-lined with the PCC designed to incinerate chemical agents drained from bulk containers, and the SCC designed to process spent decon and ensure destruction of agent. The ATLIC is designed so that the waste feed is pumped at a continuous, uniform rate to the PCC. The waste feed is mixed with combustion air and is dispersed into the chamber with an air-atomizing nozzle. Supplemental fuel (natural gas) is used for temperature control within the PCC.

The PCC will be a horizontal, refractory-lined steel cylinder that is 12.5 feet (ft) in length and a diameter of 3.5 ft. It will be refractory lined with a high-alumina corrosive-resistant SR90 brick. One end of the chamber will be flanged and sealed with a flat steel plate, which can be removed for refractory repair. A single burner assembly and waste feed injection nozzle will be mounted to the chamber end plate.

Combustion air will be introduced to the burner assembly through a wind box, which will enter into the primary chamber. As part of the burner assembly, a 3-million-Btu/hr natural gas fueled burner will be used to ensure a stable flame pattern within the PCC and to control chamber temperature, which is maintained between 2,550 °F and 2,850 °F. Natural gas will be fed to the PCC burner at rates between 49 and 150 lb/hr (see the Mass/Energy Balances in Appendix C).

Thermocouples at the exit of the PCC will measure the PCC exit gas temperature. The temperatures will be transmitted to the Programmable Logic Controller (PLC) for temperature control. The natural gas supplied to the PCC burner assembly will be modulated to maintain the PCC exit gas temperature at the setpoint.

Surrogate compounds, Agent GA, or Lewisite will be supplied to the ATLIC PCC by a waste feed injection nozzle. Agent will be dispersed into the burner flame through the air-atomizing feed nozzle. The waste feed nozzle will be capable of processing neat agent. Processing rates for the furnace will be established during the ATLIC STB.

Due to the fact that GA contains chlorobenzene, which is difficult to incinerate, there will be an increase in residence time. This increase will help to oxidize the agent and improve the processing of chlorobenzene. Plant air is used to atomize the agent fed through the PCC liquid injection nozzles.

The furnace pressure will be maintained below the pressure in the ATLIC room, at a nominal -3.0 to -7.0 inches water column (inWC). The furnace pressure will be varied by modulating the speed of the ID fan to maintain the pressure control setpoint. Pressure instruments measure the furnace and room pressures and will be transmitted to a PLC pressure controller.

2.2 SECONDARY COMBUSTION CHAMBER

Exhaust gases from the PCC enter directly into the SCC. The SCC will be a horizontal, refractory-lined steel cylinder that is 12 ft in length and has a diameter of approximately 4 ft. The refractory will be a corrosive-resistant Ruby Brick with Ruby bond mortar. A flanged inlet in the side and toward one end of the chamber provides an inlet for the exhaust gasses from the primary chamber. The ends of the chamber are flanged and sealed with flat steel plates. The end plates are removable for refractory repair.

A single burner assembly and two liquid injection nozzles will be mounted to the SCC inlet end plate. The two liquid injection nozzles utilize compressed air for atomization of either spent decon or process water fed to the chamber. The burner assembly consists of a wind box, fuel gas injector, and combustion zone. Combustion air is introduced to the burner assembly through the wind box. A 1-million-Btu/hr natural gas fueled burner will be used to ensure a stable flame pattern within the SCC and to control chamber temperature. Natural gas will be fed to the SCC burner at rates between 16 and 50 lb/hr (see the Mass/Energy Balances in Appendix C).

Thermocouples at the exit of the SCC measure the ATLIC exit gas temperature, and then the temperature readings are transmitted to the PLC for temperature control. Either the fuel supplied to the burner or the water/spent decon supplied to the liquid injection nozzles will be modulated to maintain the SCC chamber exit gas temperature at the setpoint.

The SCC will operate at temperatures between 1,850 °F and 2,150 °F. Either spent decon, generated from facility maintenance activities and the rinsing and decontamination of TCs, or process water is introduced through two liquid atomizing nozzles (with nominal flow rates during normal operations of 0.8 gpm) to lower temperature of the gas as it enters the SCC. The spent decon or water evaporates and destroys any organic compounds present. Spent decon will

be supplied only if all process conditions are met, while process water will be used at all other times. The process water flow rate is limited by the control code to a minimum of 215 lb/hr for cooling of the liquid injection nozzles. Plant air is used to atomize the spent decon or water fed to the SCC liquid injection nozzles.

The furnace pressure is maintained below the pressure in the ATLIC room. The ATLIC pressure is maintained at a nominal -3.0 to -7.0 inWC. The furnace pressure is varied by modulating the speed of the ID fan to maintain the pressure control setpoint. Pressure instruments measure the furnace and room pressures, and will be transmitted to a PLC pressure control.

2.3 DESCRIPTION OF THE WASTE FEED NOZZLES AND GAS BURNERS

A natural gas fueled burner is used to ensure a stable flame pattern within the PCC and to control chamber temperature. The PCC temperature is maintained by a 3-million-Btu/hr natural gas fired burner. An air-atomizing waste feed nozzle is mounted next to the burner and angled towards the burner such that material fed through the waste nozzle mix with the hot burner gases. The operating temperature of the ATLIC primary chamber is maintained at a setpoint of approximately 2,700 °F.

The ATLIC combustion air blower provides combustion air through a supply duct to both the PCC and SCC burner assemblies. The air flow volume will be measured to the PCC and SCC burners by an orifice plate in the combustion air duct. A flow-control valve in the combustion air supply duct to each furnace chamber burner maintains the desired flow to the burners. The combustion air flow will be set proportional to the fuel flow during furnace ramp-up and ramp-down. During normal operations, the combustion air flow will be maintained at a constant rate to provide excess air in both chambers for combustion during agent and waste processing to ensure complete destruction of agent and organic compounds.

The ATLIC secondary chamber temperature is maintained by a 1-million-Btu/hr natural gas fired burner at a setpoint of 2,000°F. Exhaust gases from the PCC enter directly into the ATLIC SCC. Spent decon or water is introduced into the SCC through air-atomized nozzles located next to the burner to lower the temperature of the gas as it enters the secondary chamber. The nozzles are capable of flows up to 2 gpm. The nominal flow rate through the nozzles during normal operations will be 0.8 gpm. The spent decon/water evaporates, and any organic residue burns. A natural gas fueled burner is used to ensure a stable temperature within the secondary chamber.

2.4 DESCRIPTION OF THE AUXILIARY FUEL SYSTEM

Natural gas is fired to heat both the PCC and the SCC to the proper operating temperatures prior to feeding the surrogate mixture or spent decon. It is supplied to the PCC through a line to the burner system and supplements the injected chemicals to maintain the desired combustion temperatures. Natural gas is supplied to the SCC through a line to the burner to provide

supplemental heating during periods of high spent decon feed rates to offset the cooling provided by the spent decon. A pressure regulator reduces the fuel supply pressure to the burners. The fuel flow rate will be measured by an orifice plate, and regulated by a flow control valve and controller. Both burners are equipped with independent monitors, controls, interlocks, and fail safe devices required by the National Fire Protection Association.

A flame safety shutdown system (FSSS) ensures safe operation of the burners. The FSSS is located in the burner management system (BMS) panel and connects to the furnace controls through a PLC. The BMS controls all furnace burner operations through its connections to the PLC.

2.5 AGENT TC RINSE AND DRAIN SYSTEM

Glove boxes have been used in the past to sample for types and amounts of agent in munitions. The ATLIC TC rinse and drain system will consist of two separate glove boxes that will allow the draining of Agent GA and Lewisite TCs of their liquid agent. There will also be the capability to decontaminate the TCs by draining them and rinsing the drained TCs. At the completion of the TC rinsing and draining operations, the glove boxes will be removed from the ATLIC Processing Bay to make room for the TC cutting machine, which will cut the decontaminated TCs in half to allow inspection prior to shipment to a Subtitle C TSDF. Agent GA and Lewisite TCs will be processed through this rinse and drain system individually depending on the current agent campaign.

The glove boxes are sealed environmental enclosures that prevent the escape of agent vapors to the ambient air within the ATLIC Processing Bay. The pressure within the sealed glove box is maintained negative relative to the ATLIC Processing Bay pressure by ducting that connects the glove box to the ATLIC Heating, Ventilation, and Cooling (HVAC) system.

Both glove boxes will contain agent drain systems with a roller and drive assembly to assist operators in getting the maximum amount of agent from the TCs. The valves within each glove box can be arrayed to transfer the contents of each TC to the ATLIC PCC, the Agent Collection Tank, the SDS collection tank, or the hazardous waste storage tank. The valve located outside each glove box can be arrayed to fill TCs, drained of their agent fill, with decontamination solution or water. The outside valve can also add regulated air to enhance the draining process by "air padding" the TC and/or clearing the TC eductor tubes. The agent-filled TCs will be brought from storage in Area 10 to the processing area and placed on a transfer table. The TCs *will then be placed individually into glove boxes.*

2.5.1 Agent GA TC Rinse and Drain System

The Agent GA will be drained and fed directly from the TC to the PCC. The Agent GA TCs are processed by placing the TC into the glove box and rotating it so that the two fill and drain valves are aligned vertically. A process air line is attached to the upper valve, and the drain line

is attached to the lower valve. The connections are made using specially-designed shutoff quick-connect couplers. The valves are then opened, and the air added to the TC through the top valve both prevents a vacuum from forming in the TC as the agent is removed and provides additional pressure to assist in agent draining. If plugged drain and fill valves are encountered, the same air line can be used to unplug the valve(s). If the valve(s) cannot be unplugged using compressed air, a drain lance can be inserted into the TC by removing one of the "blow-out" plugs that are located on the opposite end of the TC from the drain and fill valves.

Once emptied of its agent fill, the Agent GA TC is filled with a NaOH solution. Sufficient solution is added to fill the TC more than half way. The TC is then rotated for a predetermined period of time. The rotation of the TC ensures that the solution contacts all the TC's interior surfaces. The spent decon solution is drained from the TC to the SDS collection tank. The TC is then filled half full with water and is rotated for a specified time to allow the rinse to contact the TC interior. This water rinse is repeated a total of three times with the rinse collected in the SDS collection tank. A sample is collected from the final water rinse and analyzed for Agent GA concentration. If the agent concentration is below the WCL, (20 ppb for Agent GA), then the TCs are stored until they can be cut in half and examined for solids and transferred to an off-site Subtitle C TSDF. If the agent concentration is above the WCL, then the NaOH and water rinses are continued until the Agent GA concentration is \leq the WCL. The spent decon and water generated from rinsing the Agent GA TCs are transferred to the SDS collection tank and treated in the ATLIC SCC.

2.5.2 Lewisite TC Rinse and Drain System

Lewisite TCs are prepared for draining in a similar manner to the Agent GA TCs; the difference is the agent drained is sent to a storage tank, and the solution used to decontaminate the TC interior is a 3.0 mole/liter [molar (M)] nitric acid solution.

The Lewisite is drained from the TCs and transferred to the ACS tank where it is mixed and sampled prior to being fed to the PCC. Once drained, the Lewisite TCs are filled more than halfway with a 3 M nitric acid solution and the TC is then rotated for a specified time. The resulting nitric acid rinse is transferred to hazardous waste tank, also located in the TOX, where it is held until the Lewisite concentration has decreased below the WCL of 200 ppb. It is then shipped off-site to a Subtitle C TSDF.

Once the nitric acid is drained from the TCs, they are filled more than halfway with water, rotated, and then drained. This rinse is repeated three times, and a sample is collected from the final water rinse, which is analyzed for Lewisite concentration. If the Lewisite concentration is less than the WCL of 200 ppb, the TC is stored until it can be cut in half and examined for solids and then shipped to an off-site Subtitle C TSDF. If the Lewisite concentration is greater than the WCL, the nitric acid and water rinses are continued until the Lewisite concentration in the last water rinse is \leq WCL. The water rinses are transferred to the SDS collection tank and treated in the SCC.

2.5.3 Transparency TCs Decontamination System

In a 2009 study (5), the Transparency TCs were found to be empty. The Transparency TCs that are determined to be contaminated with Lewisite through samples collection and analyses, or through headspace monitoring results, are processed the same as Lewisite TCs. The Transparency TCs will be filled over half way with 3 M nitric acid and rotated for a specified time. The acid will then be drained and transferred to a hazardous waste tank, where it is analyzed for Lewisite and treated with nitric acid if necessary to lower the Lewisite concentration below the WCL. It is then shipped off-site to a Subtitle C TSDF. The TCs will then be filled over half full with water and rotated for a specified time. The rinse will be drained to the SDS collection tank. This rinse process will be repeated a total of three times, and a sample will be collected from the final water rinse which is analyzed for Lewisite concentration. If the Lewisite concentration is less than the WCL, the TC is stored until it can be cut in half and examined for solids before being shipped to an off-site Subtitle C TSDF. If the Lewisite concentration is greater than the WCL, the nitric acid and water rinses are continued until the Lewisite concentration in the last water rinse is \leq the WCL. The water rinses are transferred to the SDS collection tank and treated in the SCC.

2.6 DESCRIPTION OF THE WASTE FEED SYSTEMS

Three types of waste materials are fed to the ATLIC: Agent GA or Lewisite are fed to the PCC, and spent decon is fed to the SCC.

2.6.1 PCC Feed System

Pumps will be used to remove the surrogate mixture, Agent GA, or Lewisite from the TCs in the gloveboxes. The feed pumps are positive displacement pumps with variable speed controls. Two pumps are mounted to a single skid with one being the primary and the other acting as a backup. Either pump may be used as the primary supply pump. The second pump will be used as an online standby pump that can be started at any time by the CON operator if the primary pump fails. In the case of the surrogate mixture and Agent GA, the pumps will direct the material to the PCC, while the Lewisite is sent to an agent tank.

Two different pumps will be used to deliver Lewisite to the PCC. The Lewisite feed pumps are positive displacement rotary gear pumps. Two pumps are mounted to a single skid with one being the primary and the other acting as a backup. Either pump may be used as the primary supply pump. The second pump will be used as an online standby pump that can be started at any time by the CON operator if the primary pump fails. All waste feed pumps are located in the TOX.

Waste feed from the pumps will be routed through a series of control valves and instruments to the waste injection nozzle on the PCC. The waste injection nozzle is purged with compressed air

and acetic acid following completion of waste feed. The compressed air and acetic acid supply for purge of the waste feed nozzle is located on the control valve and instrument piping skid and are not connected to any outside supply. The control valve and instrument piping skid is located in the ATLIC room.

Duplex basket strainers will be provided at the inlet of each set of feed pumps. The strainers will remove any debris from the supply fluid that may cause damage to the supply pumps. A differential pressure sensor monitored by the CON will indicate strainer plugging. The duplex design of the strainers allows online switching from one basket to a clean one, making the off-line basket available for cleaning or change-out without interruption of processing.

A control valve and instrumentation skid will be supplied for field installation between the discharge of the waste feed pumps and the inlet of the waste feed nozzle. All waste feed piping with control valves and instrumentation required for safe operation of the system will be supplied on the control valve and instrumentation skid. A self-contained supply of compressed air and acetic acid to be used for purge of the waste feed nozzle will be supplied on the control valve and instrumentation skid.

2.6.2 SCC Feed System

Spent decon will be pumped via one of two SDS feed pumps to the two SCC spent decon/water supply nozzles. The SDS feed pumps are positive displacement rotary gear pumps. Two pumps are mounted to a single skid with one the primary and the other acting as a backup. Either pump may be used as the primary supply pump. Both pumps are sized to supply the required flow of spent decon to the spent decon/water supply nozzles. Only one pump will operate at a time with the second pump as an online standby that is brought online by the CON operator if the primary pump cannot maintain the required operating parameters. The SDS feed pumps are located in the TOX. A control valve in the discharge line of the pumps regulates discharge pressure by circulating excess spent decon back to the supply.

Duplex basket strainers will be provided at the inlet of the feed pumps. The strainers will remove any debris from the supply fluid that may cause damage to the supply pumps. A differential pressure sensor monitored by the CON will indicate plugging of the strainers. The duplex design of the strainers allows online switching from one basket to a clean one, making the off-line basket available for cleaning or change-out without interruption of processing.

SDS feed piping with control valves and instrumentation required for safe operation of the system will be pre-assembled (control valve and instrumentation skid) and supplied for field installation between the discharge of the SDS feed pumps and the inlet of the spent decon/water injection nozzles. The pre-assembled control valve and instrumentation skid will have a supply connection for process water. Process water will be supplied to the injection nozzles at all times when the furnace is above 1,500 °F and spent decon is not being supplied.

2.7 HEATING, VENTILATION AND COOLING SYSTEM

The HVAC system has a vital role in the safe operation of the ATLIC. The purpose of the HVAC system is to provide safe operating environments for personnel and equipment by conditioning the air, capturing any volatilized agents and preventing their release by conveying them to a filter system that will remove the agents from the air. The HVAC system will provide two streams of conditioned air. One stream provides conditioned air to the igloo that houses the glove box area, the two airlocks, and the TOX area. The second stream provides conditioned air to the ATLIC room. The HVAC system is configured in a cascading fashion so that any captured contamination flows from areas of less probability of contamination to areas of higher probability of contamination. The two streams will utilize 100 % outside air with no circulation air capability.

There will be two air handling units (AHUs) that will provide the air to the ATLIC room and glove box area. The AHUs are both natural gas-fired and both rated at less than 5 million Btu/hr. Because these sources are considered insignificant sources due to their size, they are not required to be permitted individually [i.e. no Emission Point Numbers are associated with them].

From the glove boxes and the ATLIC room, the air will be routed from a common discharge duct directly to the HVAC filter system. The filter system consists of three filter units with a combined rating of 9,000 cfm. Two filter units will be online during normal operations, while the third filter unit will be used as a spare. The air is drawn through the filters by an ID fan downstream of the filters at the exhaust end of the filter assembly. Each filter unit will consist of a particulate filter, a High Efficiency Particulate Air (HEPA) filter, three carbon adsorption filters and a final HEPA filter. The exhaust air from the filters will be ducted to a 40-ft. filter stack, which will discharge to the atmosphere. Agent monitoring is conducted on the HVAC carbon filter exhaust stacks using ACAMS, and DAAMS for Agent GA; and MINICAMS[®] for Lewisite.

Each filter unit is equipped with differential pressure sensors to measure the pressure drop across the filter banks. A change in the pressure differential between the inlet and outlet of a particulate filter or HEPA filter bank is a good indicator of the condition of the filters, so the pressure differential readings are monitored during operation of the filter unit to ensure that the banks are not clogged and are functioning properly. Airflow through the filter system is controlled by dampers within the ducts or by motor speed controllers on the filter fan motors.

An exhaust fan will be provided for each filtration unit and will be connected to a manifold downstream of the filters. In the event of loss of flow through an online filter, the back-up filter unit will be started automatically, opening the inlet and discharge dampers simultaneously at the start. When a filter change is required, the back-up filter will be brought online manually. Instrumentation will be provided to monitor and control the airflow through the filter system. Differential pressure or airflow gauges or alarms will be used to verify proper ventilation conditions throughout the facility.

2.8 DESCRIPTION OF THE AUTOMATIC WASTE FEED CUTOFF SYSTEM

The primary function of the AWFCO system interlocks is to prevent feeding hazardous waste if incineration conditions are outside the permit limits. The interlock system will automatically stop the surrogate mixture and spent decon feed, and prevent restart until the incinerator is at proper operating conditions and the interlock is manually reset. When an AWFCO is activated, the process controller immediately increases natural gas feed to the PCC and switches from spent decon feed to process water in the SCC. This maintains PCC and SCC temperatures until all wastes and waste residues exit the combustion chambers. Any residual agent in the ATLIC will be completely combusted by the residual heat in the PCC and the SCC.

The AWFCO setpoints and the basis for their activation will be the same as required in the established RCRA Permit and/or the HWC MACT Notifications of Compliance (NOC). Tables specifying the process control instruments that will be interlocked with the AWFCO system and their setpoints can be found in Appendix D. The DAQ and DSHW will be notified seven days in advance of the first AWFCO test before the surrogate mixture is burned in the system. The AWFCO system will be tested every 30 days. A discussion of the ATLIC AWFCO parameters follows.

- **PCC Exhaust Gas Temperature** – The PCC gas temperature is monitored continuously at the exit of the PCC by a thermocouple and temperature indicating transmitter 815-TIT-8471. Surrogate and spent decon feeds are stopped if the exit gas temperature falls below the low temperature setpoint on a HRA basis, or rises above the high temperature setpoint on an instantaneous basis.
- **SCC Exhaust Gas Temperature** – The temperature of the SCC exhaust gas is monitored continuously in the crossover duct by a thermocouple and temperature indicating transmitter 815-FIT-8571. This location is selected because the volume created by the section of the crossover duct extending from the SCC is included in the overall *incinerator internal volume used to calculate residence time*. Surrogate and spent decon feeds are stopped if the exit gas temperature falls below the low temperature setpoint on a HRA basis, or rises above the high temperature setpoint on an instantaneous basis.
- **Surrogate Feed Rate** – The surrogate mixture is pumped from the storage tanks to the PCC. The agent flow rate is continuously measured by a mass flow meter and flow indicating transmitters that are in series, 807-FI-8430. The AWFCO setpoint used to stop agent and spent decon feed is based on the HRA waste feed rate.
- **Spent Decon Feed Rate** – Spent decon is pumped from an SDS tank to the SCC. The spent decon flow rate to the SCC is measured continuously by a flow meter and flow indicating transmitter 829-FIT-8521. The AWFCO setpoint used to stop spent decon and agent feed is based on the HRA spent decon feed rate.

- **Agent Atomizing Air Pressure** – A minimum air pressure is required to ensure complete atomization of the agent as it enters the combustion chamber. The PCC atomizing air pressure is measured continuously by 822-PSL-8410. Waste feeds to the ATLIC will be stopped if the atomizing air pressure falls below the setpoint.
- **Spent Decon Atomizing Air Pressure** – A minimum air pressure is required to ensure complete atomization of spent decon as it enters the SCC. This parameter is controlled by use of pressure regulators and pressure switch 822-PSL-8511. Agent and spent decon feeds are stopped if the spent decon atomizing air pressure falls below the setpoint of the pressure switch.
- **Brine Delivery Pressure** – Quench Brine delivery pressure is continuously monitored by pressure element and pressure indicating transmitter 819-PI-8961 at the discharge of the Brine pump. Low Brine pressure is indicative of insufficient cooling of the exhaust gases. Waste feeds to the ATLIC are stopped if measured pressure falls below the setpoint on an instantaneous basis.
- **Water Flow to the Venturi Scrubber** – The water flow to the venturi scrubber is continuously monitored by flow sensor and flow indicating transmitter 819-FIT-9824. Adequate water flow to the venturi scrubber is essential for proper scrubbing of the exhaust gases. Waste feeds to the ATLIC are stopped if the measured value falls below the setpoint on a HRA basis.
- **Venturi Scrubber Differential Pressure** – The differential pressure across the venturi scrubber is continuously monitored by pressure differential indicating transmitter 819-PDIT-8915. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.
- **Brine Flow Rate to Scrubber Towers** – Brine is added to the top of the packed bed scrubber by pumping fluid through distribution trays over the top of the pall rings. There are three scrubber towers. The Brine flow rate to the packed bed scrubber sprays is continuously monitored by flow sensor and flow indicating transmitter 819-FIT-8921 (Tower #1), 819-FIT-8922 (Tower #2), 819-FIT-8923 (Tower #3). Waste feed is stopped if the flow rate to the packed bed scrubber tower sprays falls below the setpoint on a HRA basis.
- **Brine pH** – The Brine pH is monitored continuously by pH probes and analyzer indicating transmitters 819-AIT-8952A, B, and C to ensure the Brine remains under control. One probe is active at a time and provides the input to the PLC. Waste feeds are stopped if the measured value falls below the setpoint on a HRA basis.
- **Scrubber Tower Bed Differential Pressure** – The pressure differential of the scrubber towers are monitored continuously by 819-PDIT-8911 (Tower #1), 819-PDIT-8912

(Tower #2), and 819-PDIT-8913 (Tower #3). Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.

- Carbon Injection Feed – The feed rate of carbon to the baghouse will be monitored continuously by 819-FIT-8934. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.
- Baghouse Differential Pressure – The pressure differential across the baghouse is monitored continuously by 819-PDIT-8936. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.
- Carbon Filter Differential Pressure – The pressure differential across the carbon filter is monitored continuously by 819-PDIT-8941/8942. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.
- Exhaust Gas Flow Rate – The exhaust gas flow is monitored continuously at the exit of the PAS with an annubar flow meter and recorded by 819-FI-8932. Waste feeds are stopped if the measured value falls below the setpoint on an HRA basis.
- Blower Exhaust CO Concentration – The CO concentration is continuously measured at the ID fan discharge by CO CEMS and recorded by the FCS as 819-AIT-8302. The CO AWFCO will stop waste feeds to the ATLIC if the HRA CO concentration exceeds the permitted value corrected to 7 % O₂, dry basis. The O₂ correction factor will be calculated using the following equation:

$$CO_c = CO_m \times \frac{14}{(21 - O_{2m})}$$

where:

- CO_c = the exhaust gas CO concentration corrected to 7 % O₂, dry basis
- CO_m = the measured exhaust gas CO concentration, dry basis
- O_{2m} = the measured exhaust gas O₂ concentration, dry basis

- Blower Exhaust Gas O₂ Concentration – The O₂ concentrations are monitored continuously at the ID fan discharge by O₂ CEMS recorded by the FCS as 819-AIT-8301. If O₂ concentrations fall below the minimum setpoint or rise above the maximum, waste feeds to the ATLIC are stopped.
- ATLIC Stack Exhaust Gas Agent Concentration – Agent GA and Lewisite will not be monitored during the STB and these AWFCOs will be activated after the STB is completed. The agent concentrations in the exhaust gases at the stack are continuously monitored. The operation of the ACAMS for Agent GA monitoring and the MINICAMS in use during the Lewisite Demonstration Test will be controlled by Attachment 22 to the TOCDF RCRA Permit (7). To monitor for Agent GA, would require three ACAMS

(TEN 708 series) with one in standby and the other two sequenced so one would be sampling while the other is in the desorb and analysis mode. Lewisite will be monitored with three MINICAMS (TEN 709 series) in a monitoring configuration similar to the Agent GA ACAMS. Waste feed to all incinerators is stopped if either of the online instruments measures agent concentrations that exceed the setpoint.

The ATLIC control system is designed to minimize AWFCOs and ensure that the system is in compliance. When an instrument fails, it usually will go out of range, which creates an alarm to the process control system to alert the operator of the problem. The ECS monitors critical functions and gives advanced warnings, using pre-alarms where possible, which indicates that an alarm condition is developing. Advanced warnings give operators time to take corrective actions before operations necessitate an AWFCO.

The measurement devices that initiate AWFCOs are calibrated and maintained on a regular basis as directed by TOCDF procedures. Most instruments are calibrated on a 180-day schedule. The pH meters, 819-AIT-8952 (819-AIT-8917), are calibrated on a weekly basis. The CEMS are checked on a daily basis and undergo an annual Performance Specification Test (PST).

2.9 EXHAUST GAS MONITORING EQUIPMENT

Exhaust gases from the ATLIC are monitored with CEMS on a continuous basis for CO, O₂, and NO_x. Agent monitoring systems located in the exhaust stack monitor for Agent GA or Lewisite, but no agent monitoring will be part of the STB. For these parameters, the AWFCO will be activated when the CEMS detect conditions beyond the setpoints. Outputs from these monitors are sent to PLCs, which display the results in the CON, calculate rolling averages, and archive the data for future reference.

A separate CEMS is used to monitor the exhaust gas concentrations of CO, O₂, and NO_x. The CEMS will meet all of the performance specifications detailed in 40 CFR 60, Appendix B, "Performance Specifications" (8). Permanently installed CEMS probes will be located in the ATLIC stack. The probes supply exhaust gas to the analyzers dedicated to monitoring the ATLIC exhaust gas. The primary functions of the CEMS are to continuously measure, display, and record the gas concentrations in the ATLIC stack. Output from the CEMS will activate alarms and interrupt waste feed when preset values are exceeded. The CEMS will remotely display gas compositions and CEMS operational status. The ATLIC CEMS instrumentation is located in a climate-controlled monitoring room, which is located next to the stack.

The PLC stores data to provide remote data recording of CEMS operations at the CON. All analog and digital input/output signals will be conditioned properly to reduce noise and isolate signals from voltage transients. The control system displays and records the uncorrected and rolling averages for the gas concentrations, which are updated at least every 15 seconds. The PLC activates alarms and initiates an AWFCO when high CO or low O₂ concentrations are detected in the exhaust gas or when the control system experiences a loss of analyzer signal.

The exhaust gas sample enters the CEMS through a probe assembly located in the stack. The sample is then drawn through a heated line to the sample conditioning system where it is prepared for analysis in the analyzers.

2.9.1 Carbon Monoxide Monitors

The CO analyzer is identified as 819-AIT-8302, and it will be a non-dispersive infrared (NDIR) analyzer as described in 40 CFR 60, Appendix A, Method 10 (2). The analyzers are drift checked daily on two ranges according to the CEMS Monitoring Plan, Attachment 20 (3) within the expected concentration ranges for the incinerator. These drift checks include analyses of a zero gas and a span calibration gas. The CO monitor sends a reading to a PLC every 15 seconds. The readings are averaged over one minute by the PLC. The PLC calculates an HRA from the one-minute averages. The averages are sent to the FCS. The 40 CFR 60, Appendix B, Performance Specification 4B (8), is used to evaluate the CO CEMS performance and determine if the CO CEMS meets the calibration drift requirements. The CO CEMS initiates an AWFCO when the analyzer detects CO concentrations higher than the setpoint. If the CO monitor fails, an AWFCO will be initiated.

The NDIR analyzer's specifications are:

- Range: 0-200, 0-5000 ppm
- Accuracy: $\pm 1\%$ of full scale
- Drift: $\pm 1\%$ of full scale per week
- Reproducibility: 0.5 % of reading
- Response time: ≤ 60 seconds

The CO CEMS is drift checked daily. Gases of 0 to 2 % and 60 to 90 % of instrument span are used to calibrate and drift check the CO analyzer. Calibration gases are injected into the sampling system at the stack. Gases will be injected by opening the valve on each certified gas standard cylinder to allow the reference gas to flow under pressure to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery system and is analyzed in the same manner as an exhaust gas sample. Calibration results are stored and printed through the FCS. The concentrations of the reference gases span the expected concentrations of the exhaust gas. The span gas calibrations are considered a verification of the quality of the CEMS data.

2.9.2 Oxygen Monitors

The O₂ analyzer is identified as 819-AIT-8301, and it will be a paramagnetic O₂ analyzer. The analyzer is calibrated according to the CEMS Monitoring Plan, Attachment 20 to the TOCDF RCRA Permit (3), using a zero gas and span calibration gases. The 40 CFR 60, Appendix B, Performance Specification 4B (8), is used to evaluate the O₂ CEMS.

The O₂ analyzer's specifications are:

- Range: 0-25 Volume %
- Accuracy: $\pm 1\%$ O₂
- Drift: Less than 0.5 % of span
- Reproducibility: $\pm 0.2\%$ of measured value
- Response time: ≤ 2 minutes

The O₂ CEMS is drift checked daily using a two-point method. Gases of 0 to 2 % and 60 to 90 % of instrument span are used to drift check the O₂ analyzer. Calibration gases are injected into the sampling system at the exhaust stack. Gases will be injected by opening the valve on each certified gas standard cylinder to allow the reference gas to flow under pressure to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery system, and is analyzed in the same manner as an exhaust gas sample. Drift check results are stored and printed through the FCS. The concentrations of the reference gases span the expected exhaust gas concentrations. The span gas checks are considered a verification of the quality of the CEMS data.

2.9.3 NO_x Monitors

The NO_x analyzer is identified as 819-AIT-8304, with a span of 0 to 1,000 ppmv. The analyzer is calibrated according to the CEMS Monitoring Plan, Attachment 20 to the TOCDF RCRA Permit (3), using a zero gas and span calibration gases. The 40 CFR 60, Appendix B, Performance Specification 2 (8) is used to evaluate this CEMS.

The NO_x analyzer's specifications are:

- Range: 0 to 1,000 ppmv
- Accuracy: $\pm 20\%$ of Reference Material
- Drift: Less than 2.5 % of span
- Reproducibility: $\pm 0.2\%$ of measured value
- Response time: ≤ 2 minutes

The NO_x CEMS is drift checked daily using a two-point method. Gases of 0 to 2 % and 60 to 90 % of instrument span are used to drift check the NO_x analyzer. Calibration gases are injected into the sampling system at the exhaust stack. Gases will be injected by opening the valve on each certified gas standard cylinder to allow the reference gas to flow under pressure to the sample probe. The reference gas is drawn through the sample transport, sample conditioning, and sample delivery system, and is analyzed in the same manner as an exhaust gas sample. Drift check results are stored and printed through the FCS. The concentrations of the reference gases span the expected exhaust gas concentrations. The span gas checks are considered a verification of the quality of the CEMS data.

2.9.4 Agent Monitoring Systems

The use of the ACAMS, DAAMS, and/or MINICAMS to monitor exhaust gas for the chemical agents and the associated alarm setpoints will provide the ATLIC with the ability to demonstrate a continuous near-real time monitoring for the agent being treated. Agent monitoring will not be part of the shakedown and STB since the surrogate mixture will be used for this part of the project. These monitoring systems will be placed in use when the system begins to handle agent after the ATLIC STB.

Agent GA and Lewisite monitors will be equipped differently to provide the most effective detection of the respective agent. Agent GA will be monitored using ACAMS, a Near Real Time (NRT) monitoring system that provides a continuous record of compliance in regards to the agent emission standards. Agent GA will use DAAMS to confirm or deny the presence of agent. The DAAMS is a time-integrated air sampler, also called a "composite air sampler."

The Lewisite monitoring methods utilize a derivatization step at the sample collection inlet (distal end) to eliminate the problems associated with the instability of Lewisite during sampling and analysis. Ethanedithiol (EDT) is added to the gas stream at the distal end of the sample probe and allowed to react with Lewisite to form (2-chlorovinyl) arsonic acid which is volatile and can be easily transported to the pre-concentration tube. The MINICAMS® uses a gas chromatograph (GC) with a halogen specific detector (XSD™) for the detection of Lewisite. The Lewisite concentration is confirmed with two different MINICAMS® that have different columns, which results in different retention properties for the Lewisite derivative. To confirm the Lewisite concentration, the derivative must be detected on both MINICAMS®.

2.10 POLLUTION ABATEMENT SYSTEM

The PAS is designed to cool the exhaust gas exiting the ATLIC at approximately 2,000 °F to approximately 185 °F and remove pollutants consisting of PM, acid gases, and metals from the exhaust gas to below regulatory standards prior to being released to the atmosphere. Additional filtration for mercury removal is also part of the PAS design. The PAS will be in operation at all times that the LIC is operating, including startup and at idle with no waste in the furnace.

The PAS equipment consists of a quench tower, a packed bed scrubber, a Brine chiller, a high-energy venturi scrubber, a moisture separator, an electric gas reheater, a PAC injection system, a baghouse, a sulfur-impregnated carbon filter system, an induced draft fan, and an exhaust stack. A description of each piece of equipment and their function in the PAS follows.

2.10.1 Quench Tower

The quench tower is a vertical cylindrical vessel containing two water spray nozzles and equipped with a caustic wall wash system. The counter-flow quench tower is utilized to rapidly cool the exhaust gases as they exit the SCC. The exhaust gases enter the quench tower and flow down through the spray created by the upward-facing water spray nozzle. Evaporation of the water cools the exhaust gas to approximately 185 °F. (i.e. saturation temperature). A process water line supplies water to the quench spray nozzle. A flow control valve and flow controller varies water flow to the quench nozzle to maintain quench outlet gas temperature to a setpoint of approximately 185 °F. The quench walls are wetted for elimination of particulate buildup and partial cooling of the vessel by addition of caustic around the top perimeter of the vessel. Exhaust gas and excess liquid then exit the bottom of the quench tower, and the exhaust gas flows to the inlet of the packed bed scrubber.

The quench tower has a second spray nozzle that is installed immediately downstream of the main spray nozzle. The nozzle is connected to the emergency process water supply system, which is activated if there is loss of power. The emergency process water supply system supplies water for cooling the exhaust gas entering the quench tower. If the quench tower exhaust temperature ever reached 250 °F, a high-high temperature switch would initiate a furnace shutdown in order to prevent downstream equipment damage due to high temperatures.

2.10.2 Packed Bed Scrubber System/Brine Chiller System

Cooled and saturated combustion exhaust gas stream exits the Quench Tower and enters the packed bed scrubber system. The packed bed scrubber system consists of three packed bed towers, an integral liquid sump, a supply pump, a heat exchanger, and a scrubber liquor chiller system. The three packed towers are vertical cylindrical vessels with a bed of packing and a Brine distribution system that are connected in series so that the exhaust gas enters each vessel at the bottom and exits at the top. The exhaust gas temperature is reduced through contact with the cooled liquid, condensing moisture and absorbing any acid gases. The packed towers utilize direct contact cooling with the Brine to remove PM and acid gases. The Brine in the packed bed scrubber train reacts with the acid gases present in the combustion exhaust gas stream. The Brine is pH controlled to > 7.0 using 18 Wt% NaOH solution. A baffle in the sump prevents the gas from moving to other sections of the sump. The gas flows upward through the packed towers and is brought in contact with the Brine. The packed towers provide a large surface area and are structured to provide good contact between the exhaust gas and Brine. Acid gases present react with the caustic in the Brine to form salts that dissolve in the scrubber liquid. Other compounds that are water soluble are also removed from the exhaust gas. The Brine exits the bottom of the packed towers and drains to the common sump.

Brine is continuously drained from the common sump by the Brine circulation pump. The circulation pump moves Brine from the sump through an air-cooled liquid cooler and chiller heat exchanger to the Brine injection nozzles located at the top of each packed tower. The air-cooled exchanger is a packaged unit that cools the liquid by forcing ambient air over heat exchanger

coils using a set of electrically-driven fans. The chiller heat exchanger is a packaged unit that cools the liquid by circulating chilled liquid over heat exchanger coils. The coolers operate continuously during operation of the LIC PAS. Cooling the Brine to the packed bed vessels allows for removal of heat that is transferred to the liquid by contact with the exhaust gas, thereby allowing for improved arsenic removal.

The Brine pH in the sump is continuously monitored by three pH monitors and maintained within normal operating values by the addition of 18 % NaOH solution. The pH meters send a signal to the controller that varies caustic flow to the sump to maintain Brine pH at the setpoint. To prevent the uncontrolled addition of caustic to the scrubber sump if neither packed bed scrubber pump is running, the caustic control valve is driven closed.

The liquid level within the scrubber sump is also continuously monitored and maintained within normal operating levels. Depending on the level alarm, different controls will be initiated (i.e., a furnace waste stop feed, a removal of scrubber liquid from the sump, or addition of water). Process water is supplied to the quench tower/packed tower sump to make up for the water that is lost through evaporation and the Brine blowdown. The Brine from blowdown will be taken off-site via tanker trucks.

Flow meters, flow controllers, and control valves maintain the Brine flow to the packed towers at a constant rate. This rate is set by the operator to optimize the gas-to-liquid ratio for better removal of the pollutants.

2.10.3 High-Energy Venturi Scrubber/Moisture Separator

The exhaust gas from the packed towers enters the venturi scrubber, where the scrubber uses a high-energy design with a fixed throat to help accelerate the exhaust gas as it enters the throat of the venturi. Water is atomized and injected into the accelerated exhaust gas through a nozzle at high pressure. The high-pressure atomization and extreme turbulence in the venturi throat provides the conditions to removal small particulate at high efficiency rates. The exhaust gas exits the venturi scrubber and enters the moisture separator.

The moisture separator is sized to slow the velocity of the gas, which allows the particulate-laden fluid to separate from the gas stream and fall into the venturi sump. The exhaust gas flows upward to the separator discharge where there is a chevron-type entrainment separator located at the top of the separation chamber to ensure against the loss of liquid droplets from the separator.

2.10.4 Exhaust Gas Electric Reheater

The combustion exhaust gas stream exits the venturi scrubber moisture separator saturated with water vapor (100 % relative humidity) and enters the electric reheater where it is heated to a temperature of at least 30 °F above the estimated dew point temperature of the exhaust gas stream. The reheater consists of electric heating elements that extends into a section of the exhaust duct between the exit moisture separator and the inlet of the baghouse. Thermocouples

in the exhaust duct downstream of the heating unit monitor the exhaust gas temperature and provide a signal to the heater control to maintain the outlet gas temperature at the setpoint. The operating setpoint for the reheater temperature controller is set in the PLC by the ATLIC CON operator. The exhaust gas temperature is raised to ensure that the relative humidity of the exhaust gas is below 100 %. There is an alarm that will turn off and lock out the reheater while generating a stop waste feed for the furnace if the exhaust gas temperature downstream of the reheater exceeds a preset high temperature limit.

2.10.5 Powdered Activated Carbon Injection System

The exhaust gas continues to flow downstream of the reheater where it is injected with PAC through a nozzle for removal of mercury and trace organic compounds. The PAC injection system consists of a storage unit, rotary feeders, a variable speed volumetric feeder, and a high pressure transport blower/eductor. The feed system is located beneath the storage unit and is fed into a feed hopper. A volumetric feeder, mounted on a weigh scale, meters the PAC to an eductor while it is introduced into the transport air stream. The transport air is provided by a high pressure transport blower.

The rate of PAC feed to the system is continuously calculated from the change in weight of the feeder. The feed rate calculation is reset when a fill cycle of the feeder is initiated. The flow sensor is located at the injection nozzle to verify that PAC is being fed to the system at all times.

2.10.6 Baghouse

The PAC-injected exhaust gas flows directly into a baghouse comprised of a number of vertically-mounted filter bags. The exhaust gas enters the baghouse and travels through the filter bags, and exits from the baghouse. Particulate matter contained in the exhaust gas is removed as it passes through the filters and remains on the outside of the filter bags. The filter bags are cleaned sequentially with compressed air. The entire cleaning cycle is automatically initiated based on the pressure differential or elapsed time. Particulate material dislodged from the filter bags falls into a hopper below the bags. The baghouse hopper is sloped to a center discharge equipped with a rotary airlock/feeder.

The PM is periodically removed from the baghouse hopper based on a signal from a level sensor located in the hopper or a specified time interval. The baghouse discharge rotary airlock/feeder starts from a control signal and runs for a specified period of time, discharging the collected PM from the baghouse hopper. The PM discharged from the baghouse rotary feeder falls into a containment bin that is periodically removed for landfill disposal according to permit requirements. A flexible joint connects the baghouse discharge rotary feeder to the collection bin for containment of the discharged particulate. The base of the baghouse is enclosed for containment of any fugitive dust. The enclosure around the base of the baghouse is equipped with accessible doors that allow the positioning of empty containment bins beneath the baghouse discharge and removal of filled containment bins.

2.10.7 Carbon Filter System

The filtered combustion exhaust gas stream exits the baghouse and enters the carbon filter system where trace organic vapors, PM, and mercury are removed from the exhaust gas. The carbon system consists of two redundant filter beds where one bed is online during normal operations and the second filter bed is used during emergency or maintenance operations.

Each carbon filter bed consists of a pre-filter followed by a HEPA filter, an activated carbon bed, and a second HEPA filter. The differential pressure across the carbon bed will be continuously monitored to detect filter plugging. The carbon is impregnated with sulfur to remove mercury. The mercury removal efficiency of the carbon bed is approximately 99.99 %.

2.10.8 ID Fan

An ID fan is associated with the PAS system and is sized to provide the motive force required to move the exhaust gas stream through the complete PAS. The ID fan also consists of a single-stage fan with variable frequency drive (VFD) that modulates the speed of the fan to control the speed and maintain furnace pressure at a slightly negative pressure. The ID fan is provided with a variable-position damper located downstream of the fan. The fan discharges to the exhaust stack. Agent GA and Lewisite will be monitored using ACAMS, MINICAMS[®] and DAAMS in the duct between the ID fan and the exhaust stack.

2.10.9 Exhaust Stack

The combustion exhaust gas stream exits the ID fan and enters the exhaust stack. The exhaust stack is 40 feet in height and includes flanged ports installed 90° from each other around the circumference of the exhaust stack for exhaust gas emission sampling and the CFMS equipment. The exhaust gas emissions will be continuously monitored in the stack using a CEMS for the presence of CO, O₂, and nitrogen oxides (NO_x).

2.11 CONSTRUCTION MATERIALS

The construction materials for the incinerator system components are listed in Table 2-1.

TABLE 2-1. AREA 10 LIQUID INCINERATOR CONTRUCTION MATERIALS

COMPONENT	CONSTRUCTION MATERIAL
Primary Combustion Chamber	SR90 Refractory-lined (aluminum silicate up to 52% or crystalline silica up to 52%) carbon steel
Combustion Air Blower	Carbon steel
Secondary Combustion Chamber	Ruby SR Refractory-lined (alumina up to 50% or amorphous silica up to 40%) carbon steel
Quench Tower	Upper Section - AL6XN aluminum; Lower Section - Type 316 Stainless Steel
Packed Bed Scrubber Tower	Type 316 Stainless Steel
Venturi Scrubber	Type 316 Stainless Steel
Induced Draft Fan	carbon steel housing
Packed Bed Scrubber Pump	Type 316 Stainless Steel
Scrubber Blowdown Pump	Type 316 Stainless Steel
Moisture Separator	Type 316 Stainless Steel
Electric Re-Heater	Type 316 Stainless Steel
Baghouse	Type 316 Stainless Steel
Carbon Filter Unit	Type 316 Stainless Steel
Discharge Stack	Fiberglass Reinforced Plastic

2.12 LOCATION AND DESCRIPTION OF TEMPERATURE, PRESSURE, AND FLOW INDICATING AND CONTROL DEVICES

This section provides a general description of the FCS, temperature, pressure, flow, and other instrumentation necessary to ensure compliance with all permit conditions. A discussion of the major controls of the ATLIC is also provided. The locations of the process control instruments are shown on the drawings provided in Attachment 4 to the permit modification, which also shows the instruments that are used to monitor plant operations and record data for the facility operating record and the preparation of the STB report. A list of the alarm settings for key process monitoring equipment is found in Appendix D.

Control of equipment is provided through the FCS from the Area 10 CON. All motors have a Hand-Off-Auto or Local Off-Remote Hand Station and emergency stop (E-stop) pushbutton located near the motor. Each hand station is connected to a Simocode motor controller that

monitors motor current, controls starting and stopping of the motor it is connected to, and relays all hand station activity and motor status (including motor current) to the FCS. The ID fan has an E-stop as the only local form of control and manual control is from the front panel of the VFD or through the FCS.

The proper operation of this monitoring and control equipment is necessary to ensure consistent compliance with all permit conditions and safe, efficient operation of the ATLIC. Although all process monitoring instrumentation receives periodic maintenance, the equipment critical to compliance with permit operating conditions receives additional attention. Key issues associated with these instruments include:

- Continuing and preventive maintenance;
- Verification of instrument calibration; and
- Verification of AWFCO integrity.

The preventive maintenance program is supported by information received from daily and periodic inspections of the process equipment. Instrument calibration and preventive maintenance are performed following the procedures and frequencies shown in Table 2-2. A description of the most significant control loops follow.

2.12.1 Facility Control System

The primary function of the FCS is to safely and efficiently monitor and control the process systems, process support systems, and control systems that are located within the facility. The FCS is composed of microprocessor-based electronic controllers with the primary function of assisting operations personnel in the safe startup, monitoring, control, data logging, alarming, and planned shutdown of the facility. Operation of the FCS will be conducted from a CON located in proximity to the ATLIC.

The FCS is composed of manufacturer's standard hardware, systems software, and firmware that will be configured to meet individual systems control requirements. The FCS system will consist of hardware including operator and engineering workstations that provide data collection, data storage, report generation, and programming capabilities. The FCS requires electric power and an Uninterruptible Power Supply capable of sustaining the system should a substantial primary power interruption occur. A configurable, real-time and historical data collection package will provide the functions of trending, logging, and reporting. The system will back up historical data to removable media for long-term historical data storage. Data archiving will be provided for all data types. There will be a primary and backup domain servers for the FCS network in accordance with the specification(s) of the chosen equipment.

TABLE 2-2. INSTRUMENT CALIBRATION FREQUENCY

Item No.	Tag Number	Process Data Description	Calibration Frequency (days)
1	815-FIT-8430	Agent Feed Rate	180
2	822-PSL-8410	Agent Atomizing Air Pressure	180
3	815-TIT-8471	Primary Chamber Temperature	180
4	815-FIT-8521	Spent Decon Feed Rate	180
5	822-PSL-8511	Spent Decon Atomizing Air Pressure	180
6	815-TIT-8571	Secondary Chamber Temperature	180
7	819-FIT-8932	Exhaust Gas Flow Rate (Unit Production Rate)	180
8	819-P1-8982	Scrubber Delivery Pressure	180
9	819-FIT-8921	Brine Flow to Scrubber Tower #1	180
10	819-FIT-8922	Brine Flow to Scrubber Tower #2	180
11	819-FIT-8923	Brine Flow to Scrubber Tower #3	180
12	819-PDIT-8911	Scrubber #1 Pressure Drop	360
13	819-PDIT-8912	Scrubber #2 Pressure Drop	360
14	819-PDIT-8913	Scrubber #3 Pressure Drop	360
15	819-FIT-8924	Brine to Venturi Scrubber Flow	180
16	819-PDIT-8915	Venturi Exhaust Gas Pressure Drop	360
17	819-AIT-8952A 819-AIT-8952B 819-AIT-8952C	Scrubber Brine pH	7
18	819-AI-8983	Brine Specific Gravity	180
19	819-AIT-8917A 819-AIT-8917B 819-AIT-8917C	Venturi Sump pH	7
20	819-AI-8927	Venturi Sump Specific Gravity	360
19	819-TIT-8931	Baghouse Inlet Temperature	180
20	819-PDIT-8936	Baghouse Pressure Drop	360
21	819-WI-8933	Carbon Injection Feed Weight	180
22	819-FIT-8934	Carbon Injection Air Flow	180
23	819-PDIT-8941 8942	Carbon Filter Pressure Drop	360
24	819-TIT-8939	Carbon Filter Inlet Temperature	180
25	819-AIT-8302	Blower Exhaust CO Concentration	Daily
26a	819-AIT-8301	Blower Exhaust Gas O ₂ Low	Daily
26b	819-AIT-8301	Blower Exhaust Gas O ₂ High	Daily
27a	TEN 708AK	Stack Exhaust Agent GA	Every 4 hr
27b	TEN 708BK	Stack Exhaust Agent GA	Every 4 hr
27c	TEN 708CK	Stack Exhaust Agent GA	Every 4 hr
28a	TEN 709AL	Stack Exhaust Lewisite	Every 4 hr
28b	TEN 709BL	Stack Exhaust Lewisite	Every 4 hr
28c	TEN 709CL	Stack Exhaust Lewisite	Every 4 hr
28d	TEN 709DL	Stack Exhaust Lewisite	Every 4 hr

The FCS has a centralized control console, including closed-circuit television monitors (for observing operations at various locations), and locally mounted PLCs. Most processing and sequencing operations are controlled automatically through the PLCs. Interlocks are provided to prevent improper facility operation. These interlocks are monitored and continuous checking is undertaken to determine any failure to complete a programmed step. The FCS logs abnormal conditions, operator entries into the system, and starting and stopping of equipment with the time of occurrence. The control system provides continuous automatic control of the incineration process. In monitoring critical functions, the process control system gives advanced warnings using pre-alarms where possible, indicating that an alarm condition is developing, which warns operators in time to take corrective action.

The application software will control process functions, manipulate data, maintain configuration control, do graphic displays, conduct alarm management, data logging, trending, report generation, system diagnostics, and instrument maintenance management.

2.12.2 PCC Agent Feed Rate Control

The agent flow to the PCC feed nozzle will be monitored constantly by means of mass flow meter 807-FI-8430 on the agent feed lines. Their measurements are totaled by 807-FQI-8430 and the result compared to setpoint by 807-FIC-8430. The 807-FIC-8430 then drives a variable speed motor for the agent pump 807-HX-8693 to the appropriate speed for the desired flow.

2.12.3 PCC Pressure Control

The differential pressure between the ATLIC furnace room and the PCC is monitored constantly by means of pressure transmitter 815-PII-8470 mounted near the top of the PCC. Pressure controller 815-PIC-8470 sends a signal to 819-HS-8945 located on the motor of the ATLIC ID fan. The 815-PIC-8470 then modulates the ID fan motor to maintain the PCC at least 0.5 inWC negative relative to the ATLIC furnace room. High-High PCC pressure switch 815-PSHH-8470 actuates alarm switch 815-PAHH-8470. A continuous record of the PCC pressure is maintained by the FCS through 815-PIC-8470.

2.12.4 PCC Exhaust Gas Temperature and Burner Controls

During normal operation, modulating the natural gas flow rate to the PCC burner provides control of the PCC exhaust gas temperature. Temperature controller 815-TIC-8471 controls the PCC burner gas rate by modulating control valve 818-FV-8443 to maintain PCC exhaust gas temperature. The burner has a 10-to-1 turndown ratio. A low-low PCC exhaust gas temperature transmitter 815-TT-8471 actuates alarm 815-TALL-8471 and an AWFCO if the PCC exhaust temperature falls below the low temperature setpoint. High temperature is sensed by 815-TT-8471, and will actuate an alarm and an AWFCO if the temperature rises above the high temperature setpoint. A continuous record of all the temperatures discussed above is maintained by the FCS.

2.12.5 SCC Exhaust Gas Temperature and Burner Control

The SCC temperature will be maintained by measuring the SCC exhaust gas temperature in the duct exiting the SCC. The SCC exhaust gas temperature controller 815-TIC-8571 modulates the process water valve and/or fuel gas valve depending on whether SDS or process water is being used as a quenching medium in the SCC. Low-low temperature alarm 815-TALL-8571 and high temperature alarm 815-TAH-8571 actuate alarms and AWFCOs if the SCC exhaust gas temperature falls below the minimum temperature setpoint or rises above the maximum temperature setpoint.

Temperature control in the ATLIC SCC is accomplished in two ways. When not processing spent decon, the chamber temperature is maintained by modulating the burner firing rate and the amount of water cooling in the chamber. The burner firing rate is modulated down to the low-fire limit, and the water spray is modulated open to quench the high-temperature exhaust gas from the primary chamber. When the SCC is processing spent decon, the burner firing rate is modulated to maintain the temperature setpoint, and the spent decon feed rate is held constant.

2.12.6 SCC Spent Decon Waste Feed Control

The flow of spent decon to the SCC is monitored constantly by means of flow meter 829-FE-8521 on the common spent decon-water spray line. After signal processing by 829-FIC-8521, the spent decon feed rate is transmitted to the FCS to maintain a continuous record. Flow-indicating controller 829-FIC-8521 also controls flow valve 829-FV-8521 to the SCC spray nozzle. A high flow rate alarm 829-FAH-8521 will actuate an AWFCO if the feed rate exceeds the setpoint on a HRA basis.

2.12.7 Quench Brine Flow

The Brine flow to the quench tower sprays is measured by means of magnetic flow meter 819-FE-8980. A flow controller valve varies water flow to the quench nozzle to maintain quench outlet gas temperature at the setpoint.

2.12.8 Venturi Scrubber Water Flow

Water is sprayed radially and tangentially into the venturi scrubber. The water flow rate is measured by the magnetic flow meter 819-FE-8924. Water flow data are provided to the FCS for continuous process monitoring. Low-flow alarm 819-FAL-8924 actuates an AWFCO if flow falls below the setpoint on a HRA basis.

2.12.9 Brine pH

The Brine pH is monitored by means of three pH analyzers 819-AIT-8952A, 8952B, and 8952C. Indicating controller 819-AIC-8952 activates 819-HS-8907 to adjust the addition of caustic to

maintain the desired pH and provides input to the FCS for continuous process monitoring. Low pH alarm 819-PHL-8952 actuates an AWFCO if the pH falls below the setpoint on a HRA basis.

2.12.10 Venturi Scrubber Differential Pressure

Pressure indicator 819-PI-8915 measures the differential pressure across the venturi scrubber. Indicating controller 819-PDI-8915 provides input to the FCS for process monitoring. The same PDI provides high and low differential pressure alarms 819-PDAH-8915 and 819-PDAL-8915. An AWFCO is initiated if the differential pressure falls below the setpoint on a HRA basis.

2.12.11 Scrubber Tower Sump Level Control

The brine sump level is measured by level indicating transmitter 819-LIT-8951. Indicating controller 819-LIC-8951 provides input to the FCS for continuous level monitoring. The same indicating controller provides high- and low-level alarms 819-LAH-8951 and 819-LAL-8951, respectively. It also controls the level in the brine sump by opening solenoid valve 819-HV-8951 to adjust the quantity of process water added to the sump. If a low-low level is detected, low-low level alarm 819-LALL-8951 will be activated. If a high-high level is detected, alarm 819-LAHH-8951 will be activated. If either the low and low-low level alarms, or the high and high-high level alarms are simultaneously activated, waste feed is stopped, and the turnace PCC and SCC burners will automatically shutdown. Additionally, if 819-LAHH-8951 is activated, all liquid inputs to the scrubber sump are isolated.

2.12.12 Baghouse Pressure Drop

Prior to entering the baghouse the exhaust stream is injected with carbon to remove Hg and trace organic compounds. The exhaust gas enters the baghouse before the filter bags and travels upward, passing through the filters and exits from the top of the baghouse. Differential pressure indicating transmitter 819-PDIT-8936 senses the pressure drop, while providing continuous pressure drop input to the FCS, and provides alarms when the pressure drop increases or decreases to unacceptable values. An AWFCO is initiated if the differential pressure falls below the setpoint on a HRA basis. The filter bags are cleaned sequentially with compressed air. The entire cleaning cycle is automatically initiated based on pressure differential or elapsed time. To control fugitive dust, the PM that dislodges from the filter bags falls into a sloped hopper below the bags, which leads to a center discharge to an enclosed containment bin.

2.12.13 Carbon Filter System Differential Pressure Control

The differential pressure across the carbon filter will be continuously monitored using 819-PDT-8941 and 819-PDT-8942 to detect filter plugging. An AWFCO is initiated if the differential pressure falls below the setpoint on a HRA basis.

2.12.14 ATLIC Exhaust Gas Oxygen Concentration

The ATLIC exhaust gas O₂ concentrations are measured continuously by O₂ analyzer 819-AIT-8301. If the O₂ concentration is below the preset low-low level setpoint, alarms 819-AAL-8301 are activated and a RCRA AWFCO is initiated. If the O₂ concentrations are above the high-high level setpoint, alarms 819-AAH-8301 are activated and an AWFCO is initiated.

2.12.15 ATLIC Exhaust Gas Carbon Monoxide Concentration

The ATLIC exhaust gas CO concentrations are measured continuously by CO analyzer 819-AIT-8302. This analyzer displays results locally and provides continuous CO data to PLC's. The PLC's calculate a one-minute average. The PLC also calculates a HRA corrected to 7 % O₂ dry volume, which is compared to the RCRA limit of 100 ppm_{dv}. If the CO concentrations are above the limit, the alarms 819-AAH-8302 are activated and an AWFCO is initiated. The averages are stored by the FCS.

2.12.16 ATLIC Exhaust Gas Flow Rate

Exhaust gas flow rates for the ATLIC are measured with annubar flow meter 819-FIT-8932. The flow meter is installed in the exhaust duct located prior to the ID fan to measure the volumetric flow rate. The annubar measures a differential pressure. The pressure difference is measured and converted to a flow rate. The FCS records the value and generates an HRA. If the HRA setpoint is exceeded, an AWFCO is initiated and audio and visual alarms are activated.

2.12.17 Uninterruptable Power Supply System

The Uninterruptible Power Supply (UPS) System, along with the generators, will provide back up power and allow for automatic transfer to critical process equipment as well as health and life safety systems (i.e. HVAC system). The generator backup distribution system will supply power to the UPS system as well as essential power in the case of temporary loss of utility power.

2.13 INCINERATION SYSTEM STARTUP PROCEDURES

This section discusses the startup procedures as required by 40 CFR 270.62(b)(2)(vii). The ATLIC is brought to full operating condition while firing natural gas before any hazardous wastes are introduced into the PCC or SCC. Full operating condition means that combustion temperatures are above the minimum for feeding waste, the ATLIC PAS is operational, the ATLIC is under vacuum, and the unit is in compliance with all regulatory limits. The start-up sequence is performed in reverse order of the direction that waste feed and combustion products pass through the system: i.e., the PAS is started first, and the waste feed systems started last. Before any of the ATLIC processing equipment can be started, all utilities and control systems must be operational. The typical time required for startup from a cold system is about 36 hours.

A test of the AWFCO system will be performed before agent is fed to the system, and the DAO and DSHW will be notified 7 days in advance of the test.

A summary of the ATLIC startup procedures is presented below.

2.13.1 Startup of the ATLIC Pollution Abatement System

The sequential steps for successful startup of the ATLIC PAS are outlined below:

Perform the following steps, as applicable:

1. Check that the caustic valves are lined up to provide pH control.
2. Confirm that the scrubber tower sump levels are within acceptable limits.
3. Verify that the ACAMS or MINICAMS and DAAMS are on line.
4. Verify that agent concentration in the furnace room is less than the setpoint.
5. Verify that there are no fuel gas leaks in the ATLIC Primary Room.
6. Verify that there are no fuel gas leaks in the ATLIC Secondary Room.
7. Start the Brine pump. Adjust flow rates, as necessary, and confirm the availability of the spare pumps.
8. Start the venturi scrubber pump.
9. Start the exhaust blower.

2.13.2 Startup of the PCC/SCC

The sequential steps for successful startup of the SCC are outlined below:

1. Verify that all valve lineups have been completed.
2. Verify that the secondary chamber spent decon/process water feed flow controller, secondary chamber feed isolation valve, and secondary chamber atomizing air valve, are in their correct positions per the furnace SOP.
3. Start the combustion air blower.
4. Initiate a furnace system purge
 - a. Primary and secondary combustion air valves go to high-fire position.
 - b. The system purge timer starts.
 - c. Primary and secondary combustion air valves go to low-fire position following completion of purge.
5. The CON operator initiates the burner light-off sequence.

NOTE: Both the primary and secondary burners will light at the same time. Both burners will lock out and the system purged must be re-initiated if either burner fails to light. A system purge is not required for a burner re-light if the primary chamber temperature is above 1,400 °F.

- a. All fuel-gas valve and running interlocks are verified.

- b. The primary and secondary burner igniters are energized.
 - c. The main gas control valves open.
 - d. The igniters are turned off ten seconds after the main gas control valves open.
 - e. The primary and secondary burner flame scanners sense flame presence and continue to monitor the flame strength. The burners will be locked out if the flame strength signal is not maintained and the primary chamber temperature is below 1400 °F.
 - f. The CON operator verifies primary and secondary burner light-off on the control screen from the BMS.
6. Initiate water flow to the secondary chamber when the temperature in the secondary chamber exhaust duct reaches 1500°F.

2.13.3 Initiation of Primary Waste Feed

Waste feed to the primary chamber may be initiated by the CON operator if the furnace is at operating temperature and all feed permissives have been met. The CON operator proceeds as follows to initiate primary waste feed.

1. Verify that all waste feed permissives are met:
 - a. Primary chamber temperature is between 2,550 °F and 2,850 °F.
 - b. Secondary chamber temperature is between 1,850 °F and 2,200 °F.
 - c. TOX is normal.
 - d. ATLIC PAS is normal.
 - e. The primary waste holding tank is above low level.
 - f. Control system is operating within normal conditions.
 - g. No process alarms are active.
 - h. No stop feed conditions are active.
2. Insert a setpoint into the primary combustion air flow controller for processing GA or Lewisite. Verify that the combustion air flow increases to setpoint.
3. Allow primary chamber temperature to stabilize to the setpoint.
4. Set the primary waste feed flow rate for waste being processed (see section 1.2).
5. Open the primary waste holding tank discharge valve from the control screen.
6. Place feed mode in AUTO (primary waste feed pump starts).
7. Initiate PRIMARY WASTE FEED from the control screen.

2.13.4 Initiation of Spent Decon Feed

Spent decon feed to the SCC may be initiated by the CON operator if the furnace is at operating temperature and all feed permissives have been met. The CON operator proceeds as follows to initiate SDS feed.

1. Verify that all spent decon feed permissives are met:
 - a. Secondary chamber temperature is between 1,850 °F and 2,200 °F.

- b. ATLIC PAS is normal.
 - c. Open interlocks for SDS tank drain valve are satisfied.
 - d. Control system is operating within normal conditions.
 - e. There are no process alarms active.
 - f. No stop feed conditions are active.
2. Open the SDS tank outlet valve.
 3. Enable the DECON FEED mode.
 4. Place the DECON FEED mode to AUTO.
 5. Verify that the spent decon feed pump starts.
 6. Verify that the spent decon feed valve opens and the process water feed valve closes.
 7. Set the spent decon flow rate setpoint.

2.14 EMERGENCY/PLANNED SHUTDOWNS

The CON operator will be able to initiate an emergency shutdown of the ATLIC system by actuating the E-stop button in the CON. The CON E-stop shuts down the PCC and SCC burners, stops the combustion air blower, drives all valves to their safe position, stops primary waste feed, and stops spent decon feed. The quench sprays and the ID fan will continue operation.

There will also be an E-stop on the BMS panel in the case that an outside operator needs to initiate an emergency shutdown. The BMS E-stop shuts down the PCC and SCC burners, stops primary waste feed, stops SDS feed, and shuts down the fuel gas supply to the furnace.

In case of a planned shutdown, an acetic acid/air purge system will be used to clear all waste types from the segment of the PCC waste feed piping and waste feed nozzle. It is designed to protect personnel in protective gear from exposure to waste feed materials when working on the feed piping.

Plant Air will be supplied to the waste feed line downstream of the second feed block valve. The air purge will be used whenever primary waste feed is stopped. The feed line will be flushed independent of the purge air line except for the common connection to the waste feed line.

3.0 SAMPLING AND ANALYSIS PROCEDURES

The sampling and analysis objectives for the ATLIC STB are to demonstrate:

- Maximum hazardous waste feed rate while maintaining a DRE \geq 99.99 % for chlorobenzene and tetrachloroethene.
- Control of CO emissions by maintaining the CO concentration at \leq 100 ppm, α 7 % O₂, on a HRA basis.
- Control of PM emissions by showing that the concentration is \leq 0.0016 gr/dscf α 7 % O₂ (MACT Limits).
- That the metals emissions are in compliance with the MACT limits.
- That the PCDD/PCDF emissions are \leq 0.20 ng 2,3,7,8-TCDD TEQ/dscm α 7 % O₂.
- Control of NO_x emissions on a HRA basis.
- That the emissions of THC are \leq 10 ppmv α 7 % O₂ on a HRA basis (monitored continuously with a CEMS) and reported as propane.
- That the halogen emissions (HCl and Cl₂) are \leq 21 ppmv α 7 % O₂ expressed as HCl equivalents.

The sampling and analysis procedures included in this section were selected to accomplish the objectives discussed above. Detailed information on the sampling and analysis methods are provided in the QAPP (Appendix A), and reference to the QAPP will be made to prevent duplication of text. The rationale for the selection of the POHC is presented in Section 5.2. The PCDDs/PCDFs data are being collected to demonstrate compliance with the MACT limits.

3.1 SAMPLING LOCATIONS

Samples collected for the ATLIC STB will be divided into exhaust gas samples, process stream samples, and surrogate mixture samples. The exhaust gas samples will be collected after the ATLIC ID fan as detailed in Table 3-1. The parameters to be measured at this location include CO, O₂, metals emissions, PM, THC, PCDDs/PCDFs, NO_x, Cl₂, and HCl. The VOCs will be collected at a sampling port on the duct between the ID fan and the exhaust stack. The exhaust gas sampling ports used for the sampling methods for the ATLIC are shown in Drawing EG-22-D-8211 in Attachment 4 to the Permit Modification.

TABLE 3-1. ATLIC EXHAUST GAS SAMPLING SUMMARY

SAMPLING TRAIN	ANALYSES PERFORMED	LOCATION	PURPOSE
Method 1	Traverse Points	Each Port	Report Information
Method 2	Exhaust Gas Velocity	Isokinetic Trains	Report Information
Each Isokinetic Train	Exhaust Gas Moisture	Isokinetic Trains	Report Information
Method 0023A	PCDDs and PCDFs	Environmental Monitoring Ports in ATLIC Exhaust Stack	Report Information
Method 0031	VOCs	Sampling Port in the Duct between the ID fan and Exhaust Stack	Report Information
Method 5/26	PM, HCL and Cl ₂	Environmental Monitoring Ports in ATLIC Exhaust Stack	Report Information
Method 29	HHRA Metals	Environmental Monitoring Ports in ATLIC Exhaust Stack	Report Information
MINICAMS®	Fewsite	ATLIC Exhaust Duct ACAMS Port	AWFCOs & Report Information
CEMS	O ₂ , CO, NO _x	ATLIC Exhaust Duct CEMS Port	AWFCOs & Report Information
CEMS	CO ₂ , O ₂	ATLIC Exhaust Duct CEMS Port	Report Information

The surrogate solution will be sampled from a valve in the feed lines. Process streams sampled as part of the ATLIC STB include spent decon and Brine. A grab sample of spent decon is taken from a valve on the SDS tank. The Brine samples will be taken via taps on the side of the PAS sump.

3.2 SAMPLING METHODS

The samples for each run will be collected between the time the test starts and the time the test is declared complete. The exception to this is the collection of the spent decon sample, which will be collected before testing to allow the spent decon to be analyzed before being processed. The DAQ and DSHW representatives will be notified of times when process samples will be collected, when leak checks of sampling trains and pitot tubes will be conducted, and when sample recovery begins.

Liquid process samples will be collected according to ASTM International Method D3370 (9) by attaching a sample line to the tap and flushing the sample line. The resulting flush will be managed in accordance with applicable EPA and DSHW regulations. According to this method, the sample line is inserted into the sample container, and the tap is opened so that the sample fill time exceeds one minute for VOCs. This sampling flow reduces the loss of VOCs from the sampling container prior to closure of the container. The selected method ensures that the actual material collected is representative of the stream. Separate sub-sample bottles are used for each sample. Samples of the surrogate solution will be collected from taps in the liquid delivery system. Brine samples will be collected during the final 60 minutes of each run.

The surrogate mixture will be prepared by adding chlorobenzene, tetrachloroethene, and the metals spiking solutions to a TC. The TC will be mixed, and then the mixture will be pumped directly to the PCC to simulate the feeding of Agent GA. A sampling tap will be placed in the line between the pump and the PCC to allow collection of a sample using ASTM Method D3370 (9). One sample will be collected at the beginning of a run and another at the end of the run. Each sample will be analyzed separately.

The exhaust gas will be monitored as outlined in Table 3-1 using CEMS and selected EPA methods sampling trains. The ATLIC CEMS will collect data on the CO, O₂, and NO_x exhaust gas concentrations. (The ATLIC CEMS are discussed in Section 2.9.1 through 2.9.3.) The CO₂ and THC concentrations will be monitored using a certified CEMS supplied by the sampling subcontractor. Certification and calibration data for the sampling subcontractor's CEMS will be available after the sampling subcontractor has arrived onsite and set up the instrumentation. The exhaust gas molecular weight will be determined using the sampling subcontractor's CEMS monitoring O₂ and CO₂ or by 40 CFR 60, Appendix A, Method 3.

The EPA methods for sampling the exhaust gas will be taken from SW-846 (1) and 40 CFR 60 (2). These methods are:

- A combination of Method 5 and Method 26 (2), which will collect samples for PM, Cl_2 , and HCl emissions.
- Method 0031 (1), which will be used to collect VOC samples.
- Method 0023A (1), which will be used to collect samples for PCDDs/PCDFs.
- A Method 29 sampling train (2), which will collect samples for metals emissions.
- The ATLIC CEMS (3) will sample for O_2 , CO, and NO_x .
- The sampling subcontractor's CEMS will use Method 3A to sample for CO_2 and Method 25 to sample for THC's.

3.3 ANALYSIS METHODS

Summaries of these analysis methods are included in this section for completeness; detailed descriptions of the analysis methods are located in the QAPP (Appendix A, Section 9).

The organic compounds in the waste feed will be diluted in accordance with SW-846, Method 3585, and analyzed using a gas chromatograph/mass spectrometer (GC/MS) as directed by SW-846, Method 8260C. Metals present in the surrogate mixture are analyzed by acid digesting the sample by SW-846, Method 3050B, and then analyzing the digested sample by SW-846, Method 6020A and 7470A. Appendix A lists the specific organic compounds and metals to be analyzed as well as the methods of analysis.

The process stream samples will be analyzed by the following methods:

- Method 8260B (1), which will be used to analyze samples for VOC's.
- Method 8270D (1), which will be used to analyze samples for Semi-Volatile Organic Compounds (SVOC's).
- Method 8290 (1), which will be used to determine PCDD/PCDF concentrations.
- Methods 6020A and 7470A (1), which will determine metal concentrations.

Samples of the exhaust gas will be collected using four sampling trains and the TOCDF CEMS and the sampling subcontractor CEMS. The collected samples will be analyzed using the following methods:

- Method 5 (2) will be used to analyze PM.
- Method 9057 (1) will be used to measure halogen concentrations.
- Method 5041A (1) will be used to measure concentrations of VOCs.
- Method 0023A/8290 (1) will be used to determine concentrations of PCDDs/PCDFs.
- Methods 6020A and 7470A (1) will be used to analyze metals emission samples.

4.0 ATLIC SURROGATE TRIAL BURN SCHEDULE

The ATLIC STB is scheduled for the third quarter of 2010. The submittal of this plan will serve as the official 60-day MACT notice required for CPT plans. The DAQ and DSHW will be notified at least 30 days in advance of the actual STB date.

The STB will begin after TOCDF has: received approval of the ATLIC STB Plan; successfully completed construction of the plant; and successfully completed shakedown of the incinerator. The ATLIC STB should span about 5 days: 1 day for setup, 3 days of testing, and 1 day for cleanup. However, the ATLIC must achieve steady-state conditions by 2:00 p.m. on any test day or the run will be cancelled for that day. The exhaust gas samples will be collected for four hours with 25 % of the sampling time spent in each of 4 sampling ports.

The ATLIC STB will consist of one test condition with three replicate sampling runs. One run per day is planned. Actual sampling time during each sampling run will last about 6 hours. The ATLIC will be fed the surrogate solution at least 15 minutes before each sampling run to establish steady operation at process test conditions. This, combined with the sampling trains port changes, will cause total test time each day to be approximately 6 hours. Assuming minimal interruption of ATLIC operation during this STB, the incinerator is expected to operate for 6 or more hours per day for 3 days.

5.0 ATLIC SURROGATE TRIAL BURN PROTOCOLS

The ATLIC STB will consist of three replicate runs performed at one set of operating conditions. The surrogate mixture used for this STB will be spiked with metals to account for variations in the metals concentrations in the Agent GA that may exist between different TCs. The following subsections will discuss the waste to be burned, the selection of the POHC, the test operating conditions, waste feed rates, and total waste to be processed.

5.1 WASTE CHARACTERIZATION

Two waste streams will be treated during the ATLIC STB: a surrogate mixture and spent decon. The TOCDF does not produce or handle any liquids containing PCBs that would be regulated under TSCA and does not treat any waste materials with dioxin waste codes (i.e., F020, F021, F022, F023, F026, or F027).

5.1.1 Surrogate Mixture Feed

The liquid waste stream fed to the PCC will be a mixture of organic compounds with arsenic, lead, and mercury spiked to account for the metals in the Agent GA. Table 5-1 summarizes the composition of the surrogate mixture, which contains chlorobenzene (POHC), tetrachloroethene (POHC), and the metals spiking solution. A sample of the surrogate mixture used during this STB will be collected at the beginning and end of each run. The samples will be analyzed for chlorobenzene, tetrachloroethene, and HHRA metals. These data are for the surrogate mixture that is being processed to establish a DRE for chlorobenzene and tetrachloroethene. Chlorobenzene is present in the Agent GA in storage, which makes it the candidate for the POHC. Chlorobenzene, tetrachloroethene, and the metals will be spiked into the surrogate mixture to establish a worst case test. The DRE calculations will be based on the analyses of the surrogate mixture processed during the ATLIC STB.

5.1.2 Spent Decontamination Solution Waste Feed

Spent decon will be fed into the SCC during each of the Performance Runs. Table 1-2 summarizes the anticipated composition of spent decon under normal operating conditions. The spent decon solution used for the STB will have 2.0 Wt% sodium hydroxide and 10.0 Wt% sodium chloride to simulate the ash load to the PAS when processing Agent GA. It is necessary to use this high dissolved solids solution to demonstrate that the PAS is capable of removing high ash loads to the PAS. (See Section 5.8 for the discussion on ash loading.)

TABLE 5-1. SURROGATE MIXTURE COMPOSITION AND CALCULATED FEED RATES

Waste Feed Rate : 325 lb/hr						
Compound	Btu/lb	% of Total	Feed Rate lb/hr	Wt% Chlorine	Btu/hr	Chlorine lb/hr
Chlorobenzene	11,900	49.0	159.3	31.5	1,895,075	50.2
Tetrachloroethene	2,142	49.0	159.3	85.52	341,114	136.2
Mineral Spirits	18,000	2.0	6.5	0.0	117,000	0.0
Total		100.0			2,353,189	186.4

5.2 PRINCIPAL ORGANIC HAZARDOUS CONSTITUENT SELECTION RATIONALE

The liquid surrogate mixture consists of a collection of organic compounds selected to represent the processing of chemical agents in the ATLIC. Chlorobenzene and tetrachloroethene were selected as the POHCs for the ATLIC STB based on their thermal stability and high ranking in the EPA thermal stability ranking system guidance (5). Chlorobenzene is representative of the Agent GA because it is present in the waste stream (see Table 1-1). The RCRA regulations require the demonstration of a DRE that is $\geq 99.99\%$. The chlorobenzene concentration will average about 49 % (see Table 5-1) as will the tetrachloroethene, with the remainder accounting for the metals spiking solution added to the mixture.

The second waste stream fed to the SCC is the spent decon waste stream. Table 1-3 shows the range of compounds and concentrations that may be present in the spent decon. Some of these compounds are considered HAPs. The use of chlorobenzene as the POHC covers the chemical agent fed in the PCC and the HAPs fed to the SCC, because chlorobenzene is a Class 1 compound in EPA's thermal stability ranking system (5). The EPA guidance allows a Class 1 compound to act as a surrogate for the other Class 1 compounds and the other compounds with a lower thermal stability. The use of chlorobenzene as the surrogate allows processing of HAPs with lower thermal stability such as carbon tetrachloride, chloroform, 1,2-dichloroethane, and the other possible compounds that could be present in the spent decon.

5.3 TEST PROTOCOL AND OPERATING CONDITIONS

The ATLIC STB will be conducted to demonstrate compliance with permit conditions and regulatory limits.

5.3.1 Development of Worst-Case Criteria

The ATLIC STB will be conducted at one operating condition, which will demonstrate the minimum temperatures in the PCC and SCC. The maximum feed rates will pose the most stress to the system. Metals will be spiked into the agent feed to produce a "worst case" for metals content to cover the highest anticipated metals concentrations in the Agent GA. The spent decon will be a prepared solution that is 2 Wt% sodium hydroxide and 10 Wt% sodium chloride to simulate the ash loading to the PAS expected from processing Agent GA. (See Section 5.8 on Ash Content.) The metals spiked into the surrogate mixture will contain arsenic, lead, and mercury at concentrations that will cover the potential metals concentrations fed to the PCC and SCC by burning the Agent GA. The "worst case" operation will be simulated by feeding the surrogate mixture with metal spiking to the PCC and spent decon to the SCC. Table 5-1 summarizes the composition of the surrogate mixture, which contains chlorobenzene (POHC), tetrachloroethene, and the arsenic, lead, and mercury added for metals spiking.

5.3.2 Liquid Incinerator Surrogate Trial Burn Operating Conditions

Tables in Appendix D shows the target Group A operating parameters for the STB conditions. Samples collected will support the data needs required for the RCRA Permit, the Title V air permit, and the HWC MACT emission limits. Final STB values for these parameters may change slightly based on operational experience gained during the shakedown period.

The ATLIC STB will be performed under the following operating conditions:

- Maximum surrogate feed rate to the PCC of 325 lb/hr.
- Arsenic and lead spiked into the surrogate mixture fed to the PCC at a concentration of about 100 mg/kg; mercury spiked to produce a concentration of about 15 mg/kg.
- Maximum spent decon feed rate to the SCC of 450 lb/hr.
- Minimum PCC temperatures in the range of 2,500 °F to 2,850 °F.
- Minimum SCC temperatures in the range of 1,800 °F to 2,200 °F.
- Residence time through the PCC, SCC, and duct work to the quench tower ~ 2 sec as described in Sections 2.1 and 2.2.
- O₂ concentration will be maintained above 3 %.
- CO concentration will be below 100 ppm @ 7 % O₂.
- Pressure drop across the venturi will be ≤ 30 inWC.
- Normal quench tower and venturi scrubber process water flows.
- Minimum Brine pH.

5.4 COMBUSTION TEMPERATURE RANGES

The anticipated PCC temperatures for this STB will be between 2,500 °F and 2,850 °F. These temperatures are from the AWFCO tables located in Appendix D. Experience with the LICs indicates that the temperatures vary within this temperature range. The SCC temperature will be between 1,800 °F and 2,200 °F, which are the AWFCO limits from the tables located in Appendix D. Minimum temperature limits will be established by the ATLIC STB and maximum temperatures are set by the manufacturer's *Extreme Temperature Limit (ETL)*.

5.5 WASTE FEED RATES AND QUANTITIES OF WASTES TO BE BURNED

The surrogate mixture feed rates for the ATLIC STB will be up to 325 lb/hr, and the spent decon feed will be up to 450 lb/hr. The feed materials will be surrogate mixture and spent decon. This STB will require the surrogate mixture and spent decon to be fed to the ATLIC for a minimum of 18 hours. The quantity of surrogate mixture burned during the STB will be about 6,417 lb based on a feed rate of 325 lb/hr. The quantity of spent decon processed during the STB will be about 8,886 lb based on a feed rate of 450 lb/hr. Allowing a 25 percent safety factor, the consumption of test feed materials is expected to be about 8,000 pounds of surrogate mixture and 11,000 pounds of spent decon. The anticipated usage rates are summarized in Table 5-2. Metals feed rates will be determined by analyses of the surrogate mixture samples and the spent decon samples.

The ATLIC will reach equilibrium at test conditions with surrogate and spent decon supplemented by natural gas about 15 minutes before the start of each sampling run. A surplus of surrogate mixture and spent decon will be on hand in case operational problems require a longer testing period. The feed materials remaining after the STB may be processed through the ATLIC.

TABLE 5-2. WASTE FEED REQUIREMENTS

Activity	Surrogate Mixture Required (lb)	Spent Decon Required (lb)
Ramp-up, 20 min	108	150
Steady-State Operations, 15 min	81	112
Exhaust Gas Sampling, 6 hr	1,950	2,700
Total per Performance Run	2,139	2,962
Total for Three Performance Runs	6,417	8,886

5.6 EXHAUST GAS VELOCITY INDICATOR

Exhaust gas flow rates for the ATLIC are measured with an annubar flow meter, installed in the exhaust duct before the ID fan. The annubar is positioned in the center of the pipe to increase the velocity of the exhaust flow, which creates a differential pressure. The pressure difference is measured and converted to a scfm flow rate. The ATLIC control system records the value and generates an HRA. If the HRA setpoint is exceeded, the PLC causes a stop feed and an alarm. A maximum exhaust gas velocity will be established by the ATLIC STB.

5.7 AUXILIARY FUEL

Natural gas will be used as required to maintain temperatures in both the PCC and SCC. Natural gas is also used as pilot burner fuel for both the PCC and the SCC. The average composition of the natural gas from December 2008, showed that the Higher Heating Value averaged 1,046 Btu/ft³, and the methane concentration averaged 94.5 %.

5.8 WASTE FEED ASH CONTENT

Ash particles exiting the SCC will be collected by the Brine, baghouse, carbon filter beds, or measured in the ATLIC stack. Ash generated during the ATLIC STB will potentially come from the metals spiked into the surrogate mixture and the spent decon. Ash generated by the combustion of Agent GA will come from the combustion of organophosphorus compounds to phosphorus pentoxide (P₂O₅), which will be PM and will be removed by the ATLIC PAS. Based on the metals spiking concentrations, the metals in the surrogate mixture will contribute less than 0.1 lb/hr to the estimated ash feed rate.

The spent decon ash feed rate was estimated from the total suspended solids and total dissolved solids from the LIC HD ATB spent decon analyses, which are summarized in Table 1-3. An estimated ash feed rate of 6.4 lb/hr was calculated from the average spent decon data. The estimated maximum ash feed rate of 10.0 lb/hr was calculated from the maximum ash feed rate from the spent decon data. Therefore, it will be necessary to demonstrate an increased ash feed rate, which will be accomplished by the addition of sodium hydroxide and sodium chloride to the spent decon to produce a PM load to the PAS that will act as a surrogate for the combustion of Agent GA.

Based on the phosphorus content in the compounds identified in Table 1-1, it was calculated that a feed rate of 200 lb/hr of Agent GA would produce an ash load of 52.9 lb/hr. To match this ash load to the PAS, with a spent decon feed rate of 450 lb/hr, would require the spent decon to have a dissolved solids concentration of 11.8 Wt%. To meet this requirement, it is proposed to use a spent decon solution that is 2 Wt% sodium hydroxide and 10 Wt% sodium chloride. This resulting mixture would demonstrate the required ash loading to the PAS to allow the processing of Agent GA at 200 lb/hr.

5.9 ORGANIC CHLORINE CONTENT OF THE WASTE FEED

The surrogate compounds contain organic chlorine and the organic chlorine feed rates for the ATLIC STB are summarized in Table 5-1. The chlorine feed rate for an average composition of the surrogate mixture is 186 lb/hr, which is higher than the chlorine feed rate when feeding Lewisite at 300 lb/hr (123 lb/hr). Any chlorine measured in the ATLIC exhaust stack will probably be attributed to the combustion of the organic chlorine present in the feed.

Concentrations of HCl and Cl₂ in the ATLIC emissions will be sampled using Method 26 (2) and analyzed by Method 9057 (1). Details are given in the QAPP (Appendix A).

5.10 METALS FEED RATES

The metals fed to the ATLIC will be from the arsenic, lead, and mercury added to the surrogate mixture. The concentrations of arsenic and lead will be 100 ppm, and mercury will be 15 ppm in the surrogate mixture. Table 5-3 shows the estimated metals feed rates and the estimated metals emission rates associated with the STB. Arsenic and mercury feed rates will be established for the Lewisite in a separate CPT using Lewisite agent as the source of arsenic and mercury. The arsenic, lead, and mercury concentrations in the surrogate mixture were set to exceed the concentrations in the Agent G A TCs. Metals emissions will be sampled using Method 29 (2). The sampling and analysis details for metals emissions are given in the QAPP (Appendix A).

5.11 POLLUTION CONTROL EQUIPMENT OPERATIONS

Operation of the pollution control equipment is provided in this section as required by 40 CFR 270.62(b)(2)(vi). The anticipated operating conditions of the ATLIC PAS for the ATLIC STB are the same as standard operating conditions and are summarized in Appendix D. Fluctuations in PAS temperatures, flow rates, pressures, pH, and density will occur during this STB. These normal variations will be reported in the final ATLIC STB Report. Standard operating conditions for the pollution control equipment are described in Section 2.10.

5.12 SHUTDOWN PROCEDURES

The shutdown procedures to be observed during the ATLIC STB are discussed in this section as required by 40 CFR 270.62(b)(2)(vii). The AWFCOs for Group A are continuously monitored and interlocked. Group C parameters, which are also monitored and interlocked, will be in operation during this STB. In addition, the system's operation will be monitored closely by the system operators. If the operation of the system should deviate significantly from the desired range of operation or become unsafe, the operators will manually shut off waste feeds to the system. The AWFCO system and parameters for shutting down the waste feeds are described in Section 2.8.

TABLE 5-3. ESTIMATED METALS EMISSION RATES

Agent Feed Rate:	325 lb/hr	Total Metal Feed Rate
Exhaust Gas Flow Rate:	934 dscfm	
Exhaust Gas O ₂ Conc.:	8.8 %	
MAXIMUM FEED CONCENTRATIONS		
Arsenic Conc.:	100 ppm	0.033 lb/hr
Lead Conc.:	100 ppm	0.033 lb/hr
Mercury Conc.:	15 ppm	0.0049 lb/hr

EXHAUST GAS CONCENTRATIONS				HHRA Emission Rate (g/sec)	MACT Conc. (@ 7 % O₂) (µg/dscm)
	LIC HD ATB MRE % ^a	Emission Rate (g/sec)	Conc. (@ 7 % O₂) (µg/dscm)		
Arsenic ^a	99.99989	4.50E-09	0.012	2.54E-05	
Lead ^d	99.9960	1.64E-07	0.426	5.53E-05	
Mercury ^b	99.99	6.14E-08	0.16	5.26E-08	8.1
Semi-Volatile Metals			0.426		10
Low-Volatility Metals			0.012		23

Notes:

The MACT Limit for Semi-Volatile Metals is the summation of Pb + Cd = 10 µg/dscm.

The MACT Limit for Low-Volatility Metals is the summation of As + Be + Cr = 23 µg/dscm.

^a The MREs were taken from the LIC HD ATB Data.

^d The MRE was taken from Pilot Plant testing.

Sampling will be stopped if an AWFCO is activated during the ATLIC STB. Should the AWFCO condition persist for 2 hours, the run will be aborted. A run will also be aborted if more than three AWFCOs occur during one traverse of the four-hour sampling trains. If the DAQ and DSHW representatives approve continuing a run after either of the abort conditions is reached, the approval will be documented and included in the deviations discussions in the final report.

It may be necessary to shut down the ATLIC and PAS completely in the event of a major equipment or system failure. A shutdown of this type will be performed in strict accordance with the facility's standard operating procedures. Shutdown will be the reverse of the startup process and are discussed in Section 2.14.

Subsystems will be shut down in the following order:

1. ATLIC PCC and SCC
2. PAS
3. Utilities

Sampling will be stopped if a power failure occurs during a run. Waste feeds to the system will be stopped, but other operating parameters will be maintained to minimize emissions. Combustion air will continue to be supplied as the ID fan spins down.

5.13 INCINERATOR PERFORMANCE

Incinerator performance is discussed in this section as required by 40 C.F.R. 270.62(a). The TOCDF believes that the conditions specified in Section 5.3 for the STB will be adequate to meet the performance standards of 40 C.F.R. 264.343 while firing the surrogate mixture and spent decon because:

- TOCDF experience with both LICs burning Agents GB, VX, and mustard under similar operating conditions shows that the expected DRE will exceed 99.99 %.
- TOCDF experience with the LICs burning mustard under similar operating conditions suggests that the HCl and PM emissions will be less than the respective performance standards.
- The ranges of operating conditions planned for this STB are within the design envelope of the ATLIC and PAS.
- The ATLIC and PAS are tightly controlled by PLCs and AWFCO systems whenever hazardous waste is being fed to the ATLIC.

- One test condition will be used to establish the operating envelope for the ATLIC. The ATLIC is operated as steady-state, base-loaded incinerator, and the test condition will demonstrate the minimum temperatures and the ETL will set the upper temperature limits. Combustion air flow and velocity fluctuates as necessary to maintain the proper negative pressure in the furnace. The fluctuations in metals and chlorine feed rates should be minor.

6.0 ATLIC STB SHAKEDOWN PROCEDURES

Once the approval of this STB plan is received from the appropriate regulatory agencies, shakedown will commence as described in Section 6.2. During the shakedown period, the entire system will be thoroughly tested to verify that it performs in a safe, consistent, and predictable manner when processing the surrogate mixture.

Shakedown testing will proceed in accordance with the ATLIC STB Shakedown Plan (see Appendix B). This shakedown plan defines all activities, methodologies, shakedown criteria, and compliance actions associated with the testing of the system. As stated in the shakedown plan, operating conditions will be maintained within the envelope of anticipated final operating limits (defined in Appendix D) throughout the shakedown period. These limits on operating conditions are based on good engineering practice, over 13 years of experience processing Agents GB, VX, and mustard in the TOCDF LICs. Operating limits will comply with the requirements of 40 CFR 270.62(a)(1). Proposed operating conditions are preliminary, and final values will be confirmed or modified as shakedown progresses.

Hazardous wastes will not be fed to the system at any time unless the conditions discussed above are satisfied. The flow of hazardous waste to the incinerator will be stopped if operating conditions deviate from the established limits. The AWFCO system, described in Section 2.8, will be in operation at all times during the incineration of hazardous wastes, and the settings during shakedown will be those specified in Appendix D. Individual AWFCOs for those parameters that may cause total incinerator shutdown (such as auxiliary fuel burners, or ID fan) may be bypassed momentarily during routine calibrations. Those calibrations that require the AWFCOs to be bypassed will not be conducted when waste is in the furnace.

6.1 STARTUP PROCEDURES

The startup periods for the ATLIC will be heated until operating conditions have been reached. Temperatures will be held at operating conditions to verify that all systems are operating correctly. During this period, operation of the PAS and CEMS will be verified, and the AWFCO system will be tested to verify that all AWFCOs are operational. The systems will then be declared ready for operation, and the shakedown period will begin. The DAQ and DSHW will be notified of the AWFCO test 7 days in advance.

6.2 ATLIC SHUTDOWN

The objectives of the shutdown are to:

- Demonstrate that the ATLIC can safely and efficiently destroy the surrogate mixture at 325 lb/hr.
- Familiarize the operators with the operation of the ATLIC.
- Verify that all systems function properly.
- Verify that the agent feed ramp-up rate is suitable for the surrogate mixture.
- Verify that the spent decon feed ramp-up rate is suitable for NaOH solutions.
- Evaluate the ATLIC operating conditions required for permit compliance.
- Evaluate the impact on the SCC of simultaneously processing the surrogate mixture and spent decon.

The TOCDF will provide the DAQ and DSHW with notice before introducing the surrogate mixture into the system. The surrogate mixture will be introduced into the ATLIC in accordance with 40 CFR 264.344(c)(1) to bring the unit to a point of operational readiness for the STB. This phase will take four to six weeks and consist of up to 720 hours of surrogate processing. If TOCDF determines that more time is necessary to ensure operational readiness before the STB, an extension of up to 720 additional hours of operating time will be requested.

The shutdown period will involve a series of tests as described in the shutdown plan (see Appendix B). The TOCDF may request final modifications to the ATLIC STB Plan based on data obtained during the shutdown period. If such changes are necessary, they will be coordinated with the DAQ and the DSHW.

6.3 POST ATLIC SURROGATE TRIAL BURN OPERATION

The interim period between completion of the ATLIC STB and receipt of final approval from DSHW for full operating authority could be several months. During this time, TOCDF intends to continue operating the ATLIC on a full-time basis, under all federal requirements per 40 CFR 264, 266, and 270. The ATLIC will not be operated until the preliminary data have been approved by DSHW and DAQ, then the ATLIC operation will be restarted using Agent GA. The TOCDF expects the ATLIC to operate during this period within the operating envelope defined and demonstrated by the STB, with the exceptions of the waste feed rates. Waste feed rates shall be limited to 50 % of the average rates demonstrated during the STB until the Agent GA has

been destroyed. After the Agent GA has been destroyed, the ATLIC will begin operation using Lewisite in preparation for the Lewisite CPT.

The inspection plan will be followed of the ATLIC for fugitive emissions, leaks, and associated equipment spills and for signs of tampering, per 40 CFR 264.347(b). All appropriate operating records will be maintained for documentation of operations.

The AWFCO system and associated alarms, as described in Section 2.8, will function any time hazardous waste is in the combustion zone of the incinerator. The AWFCOs will be tested according to the established schedule. Test methods for the AWFCOs will be demonstrated before the STB shakedown begins.

6.4 INCINERATOR PERFORMANCE

The TOCDF believes that the conditions specified in Section 6.3 for the startup, shakedown, STB, and post-STB operation will be adequate to meet the performance standards of 40 CFR 264.343 while processing the surrogate mixture, Agent GA, and spent decon because:

- TOCDF experience with the LICs burning Agents GB, VX, mustard, and spent decon under similar operating conditions shows that the expected DRE will exceed 99.99 %.
- Experience at the TOCDF with the LICs burning mustard and spent decon under similar operating conditions suggests that the HCl and Cl₂ emissions will be < 21 ppm, and the PM emissions concentrations will be less than 0.0016 gr/dscf. These estimated emissions are within the performance standards.
- TOCDF experience with the LICs during incineration of Agents GB, VX, and mustard spiked with metals resulted in metals emissions that did not pose a threat to human health or the environment.
- The range of operating conditions planned for the shakedown and post-STB periods are within the design envelope of the ATLIC and PAS (refer to the Appendix C MEBs).
- The ATLIC and PAS will be tightly controlled by the PLCs, and the AWFCO systems will be operational at all times during the shakedown and post-STB periods when hazardous materials are being fed to the ATLIC.

In addition, meeting the performance standards of 40 CFR 264.343 and 63.1219 ensures protection of human health and the environment.

7.0 ATLIC SURROGATE TRIAL BURN SUBSTITUTE SUBMISSIONS

This section is not applicable since an STB will be conducted.

8.0 ATLIC SURROGATE TRIAL BURN RESULTS

The results of the ATLIC STB will be submitted to DAQ and DSHW in the report format used in prior ATB reports. The operating data will be summarized; the VOC's emissions, PM emissions, PCDD/PCDF emissions, and metals emissions will be reported; and the supporting laboratory data and data verification will be submitted.

The TOCDF will submit the ATLIC STB Report within 90 days after completion of the test. The report will be certified in accordance with the requirements of 40 CFR 270.62(h)(7-9). It should be noted that all data will be submitted for all analyses conducted, including the data from any failed runs.

9.0 FINAL OPERATING LIMITS

9.1 ESTABLISHING LIQUID INCINERATOR OPERATING PARAMETERS

The ATLIC STB demonstration of DRE, waste feed rates, spent decon feed rates, metal emissions, PM emissions, and halogen emissions will be used to establish the operating permit limits for the ATLIC. The successful completion of this STB will establish the operating permit at the levels discussed in this section.

The destruction of organic compounds is a function of time, temperature, and turbulence. The combustion temperatures and gas velocities in the system demonstrate operating conditions that ensure the destruction of organic compounds. The waste feed rates demonstrated during this STB will present the maximum challenge for the PM loading to the ATLIC PAS while processing Agent GA. The maximum challenge for PM loading for processing Lewisite will be demonstrated during a separate Lewisite Demonstration Test. The pH of the Brine in the PAS will control the emission of acid gases present in the exhaust gas.

The anticipated final operating conditions resulting from the ATLIC STB are summarized in Appendix D. These tables were prepared following the hierarchy of process-control-related performance parameters, as established by EPA guidance (5). Each anticipated ATLIC final operating limitation is listed by process parameter, target value during the STB, and anticipated manner by which the limit will be established. The process parameters presented in Appendix D are broken down by Group A, B, or C parameters, as follows:

- Group A – These parameters will be monitored continuously and will be connected to an AWFCO system. When a Group A parameter is exceeded, contaminated waste feed must be discontinued immediately. Group A parameters will be established based on demonstrated operating conditions during the STB.
- Group B – These parameters will not be monitored continuously. Compliance with these parameters will be based on operating records to ensure that routine operation is within the operational limits established by the STB.
- Group C – Limits on these parameters will be set independent of trial-burn-demonstrated parameters. Instead, these limits will be based on EPA guidance, equipment manufacturer's design and operating specifications, operational safety considerations, and good engineering practices. Group C parameters include parameters monitored both continuously and periodically. Depending upon the particular Group C parameter, it may or may not be an AWFCO parameter.

9.2 GROUP A PARAMETERS

Establishment of permit limits for the Group A parameters is discussed in the following paragraphs:

- **Maximum Hazardous Waste Feed Rates** – Maximum waste feed rates and spent decon feed rates will be Group A parameters. The ATLIC STB will be performed as close to the maximum waste and spent decon feed rates as possible. The final, approved permit limit for each waste feed stream will be the demonstrated feed rates that achieve a minimum DRE of 99.99 %.
- **Minimum PCC Temperature** – Minimum PCC temperature will be a Group A parameter related to meeting the DRE. The minimum PCC temperature will be demonstrated during the ATLIC STB, provided that a DRE of at least 99.99 % is demonstrated.
- **Minimum SCC Temperature** – Minimum SCC temperature will be a Group A parameter related to DRE and metals emissions. The minimum SCC temperature will be demonstrated by the ATLIC STB, provided that a DRE of at least 99.99 % is demonstrated.
- **Maximum Exhaust Gas Velocity** – Exhaust gas velocity (measured before the ID fan with an annubar flow meter) will be a Group A parameter related to DRE and gas treatment. Gas velocity in the ATLIC Duct is an indicator of exhaust gas residence time in the ATLIC. The final approved operating conditions will be determined from the ATLIC STB results.
- **Minimum Flow to the Venturi Scrubber** – Minimum water flow rate to the venturi scrubber will be a Group A parameter that is related to metals emissions and PM emissions. The final approved permit limit for minimum water flow to the venturi scrubber will be based on the ATLIC STB results, provided the STB demonstrates acceptable metals emissions and PM concentrations < 0.0016 gr/dscf.
- **Minimum Venturi Scrubber Differential Pressure** – The minimum differential pressure across the venturi scrubber will be a Group A parameter related to metals and PM emissions. The final approved permit limit for minimum venturi scrubber differential pressure to the venturi scrubber will be determined during the ATLIC STB provided acceptable metals and PM emissions are demonstrated.
- **Minimum Brine pH** – The minimum Brine pH will be a Group A parameter related to acid gas emissions. The minimum Brine pH will be determined based on the ATLIC STB results, provided adequate acid gas control is demonstrated.

- **Minimum Brine Flow Rate** – The minimum Brine flow rate to the packed bed scrubbers will be a Group A parameter related to acid gas and PM emissions. The minimum clean liquor flow rate will be determined based on the ATLIC STB results, provided control of acid gases and PM emissions are demonstrated.

9.3 GROUP B PARAMETERS

Establishment of Group B parameter limits based on the ATLIC STB is discussed below:

- **POHC DRE** – A DRE of 99.99 % or greater for chlorobenzene and tetrachloroethene will be demonstrated by the STB. This DRE demonstration will allow TOCDF to process the Agent GA and Lewisite contained in the munitions stored at DCD.
- **Maximum Metals Feed Limits** – Metals feed limits will be set by the metals feed rates demonstrated during the ATLIC STB for the processing of Agent GA. The metals feed rates for Lewisite will be established during the Lewisite CPT. The TOCDF expects to meet the permit limits while processing the surrogate mixture at 325 lb/hr and spent decon at 450 lb/hr.
- **Maximum PM Emissions** – The PM emissions will be measured during the ATLIC STB. The STB will be considered an acceptable PM test for Agent GA and spent decon, because the surrogate spent decon will provide the ash loading to the PAS and provided that the PM concentration is ≤ 0.0016 gr/dscf corrected to 7 % O₂.
- **Maximum Emissions of Chlorine and Hydrogen Chloride** – The expected permit condition for this parameter is 21 ppm, as required under the MACT limits.
- **Maximum PCDD/PCDF Emissions** – The expected permit condition for these parameters will be 0.2 ng/dscm of 2,3,7,8-TCDD TEQ corrected to 7 % O₂.

9.4 GROUP C PARAMETERS

Establishment of Group C parameters are discussed in the following paragraphs:

- **CEMS Operation** – CEMS operation will be a Group C parameter to comply with EPA guidance that CEMS must be operational when the ATLIC is processing wastes. A loss of instrument signal from the CO monitor or O₂ monitor will result in an AWFCO.
- **Maximum PCC Temperature** – Maximum PCC temperature will be a Group C parameter based on the manufacturer's recommendations of an ETL.

- **Maximum SCC Temperature** – Maximum SCC temperature will be a Group C parameter based on the manufacturer's recommendations of an ETL.
- **Maximum Quench Tower Exhaust Gas Temperature** – Quench tower exhaust gas temperature will be a Group C parameter based on the manufacturer's recommendations. The maximum temperature limit proposed will be 250 °F to protect temperature-sensitive construction materials in the remainder of the PAS. When the quench tower duct exit temperature exceeds the maximum limit, all waste feeds are stopped.
- **Minimum Brine Pressure** – The minimum Brine pump pressure will be a Group C parameter related to acid gas and PM emissions. The final approved permit limit for minimum Brine pump pressure will be 15 psig, provided the ATLIC STB demonstrates control of acid gases and PM emissions.
- **Maximum CO Concentration at the Blower Exhaust** – Maximum CO concentration at the blower exhaust will be a Group C parameter related to PIC control. The performance standard for CO is an HRA of 100 ppmv corrected to 7 % O₂, provided the THC average concentration for the STB is below 10 ppm and the POHC DRE are satisfactory. Waste feeds will not be resumed until the HRA concentration falls below the 100-ppmv corrected to 7 % O₂ HRA limit.
- **Minimum and Maximum Oxygen Concentration at the Blower Exhaust** – Oxygen concentration in the blower exhaust will be a Group C parameter. The ATLIC will be operated under oxidative operating conditions to treat the waste feeds. The oxygen levels in the combustion system will be controlled to a concentration between 3 and 15 % O₂ at the lower exhaust. The final approved permit limit for minimum and maximum oxygen at the blower exhaust will remain 3 % and 15 %, respectively, provided the POHC DRE are satisfactory.
- **Minimum Agent Feed Nozzle Pressure at High Feed Rate** – Sound operating practice dictates that the environment be protected against massive agent leaks. Were a major leak to occur in agent feed piping, an AWFCO immediately stops all feed.
- **Minimum Agent Atomizing Air Pressure** – The lower limit on air pressure to the agent spray nozzle is 60 psig, based on operating experience.
- **Minimum Spent Decon Atomizing Air Pressure** – The lower limit on the air pressure to the SCC spray nozzle is 60 psig, based on operating experience.

10.0 REFERENCES

- (1) *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition, including Update III. USEPA. SW-846. December 1996.
- (2) Title 40, *Code of Federal Regulations*, Part 60, Appendix A, "Test Methods."
- (3) Attachment 20 to the TOCDF RCRA Permit, *CEMS Monitoring Plan*, EG&G Defense Materials, Inc., CDRL-06.
- (4) *Hazardous Waste Combustion Unit Permitting Manual, Component 1*, "How to Review A Trial Burn Plan," U.S. EPA Region 6, Center for Combustion Science and Engineering, 1998.
- (5) *Guidance on Setting Permit Conditions and Reporting Trial Burn Results*, EPA/625/6-89/019, January 1989.
- (6) *Final Report for Ton Container Sample Analysis*, L.A. Malloy, K. Whittington, B. Fahey, B. Goodwin, Hazardous Materials Research Center, Battelle, Columbus, Ohio, October 2, 2009.
- (7) Attachment 22 to the TOCDF RCRA Permit, *Agent Monitoring Plan*, EG&G Defense Materials, Inc., TOCDF CDRL 23.
- (8) Title 40, *Code of Federal Regulations*, Part 60, Appendix B, "Performance Specifications."
- (9) "Standard Practices for Sampling Water from Closed Conduits," *ASTM D 3370-95a* (Reapproved 1999), ASTM International, West Conshohocken, Pennsylvania.

SURROGATE TRIAL BURN PLAN
FOR THE
AREA 10 LIQUID INCINERATOR

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

Revision 0

January 4, 2010

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

TOOELE CHEMICAL AGENT DISPOSAL FACILITY

Facility EPA ID Number: UT5210090002

Prepared for: Tooele Chemical Agent Disposal Facility
11600 Stark Road
Tooele, UT 84074

Revision No.: 0

Date: January 4, 2010

1.0 TITLE PAGE

1.1 Project Title:

SURROGATE TRIAL BURN FOR THE
AREA 10 LIQUID INCINERATOR
QUALITY ASSURANCE PROJECT PLAN

1.2 Expected Trial Burn Dates: September 2010

1.3 Project Approvals:

Thaddeus Ryba, CMA Project Manager

Date

Gary McCloskey,
EG&G DMI General Manager

Date

Craig M. Young, Ph.D.,
EG&G DMI, Project Specialist

Date

Subcontractor, Quality Assurance Director

Date

2.0 TABLE OF CONTENTS

1.0 TITLE PAGE	1-1
2.0 TABLE OF CONTENTS	2-1
LIST OF ANNEXES	2-4
LIST OF TABLES	2-5
LIST OF FIGURES	2-5
LIST OF ACRONYMS AND ABBREVIATIONS	2-6
LIST OF UNITS AND MEASUREMENTS	2-8
3.0 PROJECT DESCRIPTION	3-1
4.0 PROJECT ORGANIZATION	4-1
4.1 TEST DIRECTOR AND CONTRACT ADMINISTRATIVE REPRESENTATIVE	4-1
4.2 TOC'DE LABORATORY MANAGER	4-3
4.3 SUBCONTRACTOR PROGRAM MANAGER	4-3
4.4 SAMPLING SUBCONTRACTOR QUALITY ASSURANCE OFFICER	4-3
4.5 SAMPLING TEAM COORDINATOR	4-4
4.6 SUBCONTRACTOR SAMPLING TEAM MEMBERS	4-4
4.7 SUBCONTRACT LABORATORIES	4-5
5.0 QUALITY ASSURANCE AND QUALITY CONTROL OBJECTIVES	5-1
5.1 EVALUATION OF PRECISION	5-2
5.2 EVALUATION OF ACCURACY	5-2
5.3 EVALUATION OF COMPLETENESS	5-3
5.4 DETECTION AND REPORTING LIMITS	5-4
5.5 REPRESENTATIVENESS AND COMPARABILITY	5-4
6.0 SAMPLING AND MONITORING PROCEDURES	6-1
6.1 PRE-SAMPLING ACTIVITIES	6-1
6.1.1 Calibration of Process Monitoring Equipment	6-1
6.1.2 Sampling Equipment Calibration	6-1
6.1.3 Glassware Preparation	6-2
6.1.4 Sample Media Preparation	6-2
6.1.5 Additional Pre-Sampling Activities	6-2
6.2 FIELD QUALITY CONTROL ACTIVITIES	6-3
6.2.1 Reagent Blanks	6-3
6.2.2 Field Blanks	6-4
6.2.3 Trip Blanks	6-4
6.2.4 Field Duplicates	6-4

TABLE OF CONTENTS (continued)

6.3 EXHAUST GAS SAMPLING.....	6-5
6.3.1 Method 0031 for Volatile Organic Compounds	6-7
6.3.2 Method 1 to Determine Duct Traverse Sampling Points.....	6-8
6.3.3 Method 2 to Determine Exhaust Gas Velocity and Volumetric Flow Rate.....	6-8
6.3.4 Exhaust Gas Moisture Content.....	6-8
6.3.5 Combined Method 5/26 for Particulate Matter and Halogens.....	6-8
6.3.6 Method 0023A for PCDDs/PCDFs.....	6-9
6.3.7 Method 29 for Metals.....	6-10
6.3.8 Continuous Emissions Monitoring.....	6-11
6.4 PROCESS SAMPLING.....	6-12
6.4.1 Process Stream Sampling Locations.....	6-12
6.4.2 Tap Sampling Method.....	6-13
6.5 PROCESS MONITORING EQUIPMENT.....	6-13
6.6 POST-SAMPLING ACTIVITIES.....	6-13
7.0 SAMPLE HANDLING, TRACEABILITY, AND HOLDING TIMES	7-1
7.1 SAMPLE PRESERVATION AND HOLDING TIMES.....	7-1
7.2 DOCUMENTATION.....	7-1
7.2.1 Sample Labels.....	7-1
7.2.2 Sample Seals.....	7-3
7.2.3 Chain-of-Custody Forms.....	7-3
7.3 SAMPLE TRANSPORT TO THE LABORATORY.....	7-4
8.0 SPECIFIC CALIBRATION PROCEDURES AND FREQUENCY.....	8-1
8.1 PROCESS MONITORING EQUIPMENT CALIBRATION.....	8-1
8.2 EXHAUST GAS SAMPLING EQUIPMENT.....	8-1
8.3 CALIBRATION OF CONTINUOUS EMISSION MONITORING SYSTEMS.....	8-2
9.0 ANALYTICAL OBJECTIVES AND PROCEDURES.....	9-1
9.1 ANALYSIS METHODS FOR PROCESS STREAM SAMPLES.....	9-3
9.1.1 pH Analysis.....	9-3
9.1.2 Inorganic Analysis Methods.....	9-3
9.1.3 Organic Compound Analysis Methods.....	9-3
9.1.4 Surrogate Mixture Characterization Methods.....	9-7
9.2 ANALYSIS METHODS FOR EXHAUST GAS SAMPLES.....	9-7
9.2.1 Analysis of SMVOC Tubes.....	9-7
9.2.2 Analysis of Method 0023A Samples for PCDDs/PCDFs.....	9-10
9.2.3 Analysis of Metals Emissions.....	9-12
9.2.4 Analysis of Halogen Emissions.....	9-12
9.2.5 Particulate Matter Analysis.....	9-12
10.0 SPECIFIC LABORATORY QUALITY CONTROL CHECKS.....	10-1
10.1 METHOD BLANKS.....	10-1
10.2 LABORATORY CONTROL SAMPLES.....	10-1
10.3 DUPLICATE ANALYSES.....	10-1
10.4 MATRIX SPIKE SAMPLES.....	10-2
10.5 SURROGATE SPIKES.....	10-2

TABLE OF CONTENTS (continued)

11.0 DATA REPORTING, DATA REVIEW, AND DATA REDUCTION.....	11-1
11.1 DATA REPORTING.....	11-1
11.1.1 Analytical Data Packages.....	11-1
11.1.2 Analytical Data Format.....	11-2
11.1.3 ATLJC STB Report.....	11-2
11.2 DATA REVIEW.....	11-3
11.2.1 Data Validation.....	11-4
11.2.2 Identification and Treatment of Outliers.....	11-5
11.3 DATA REDUCTION.....	11-5
11.3.1 Field Data Reduction.....	11-5
11.3.2 Laboratory Analysis Data Reduction.....	11-6
11.3.3 Blank Corrected Data.....	11-6
11.4 EXHAUST GAS SAMPLE TRAIN TOTAL CALCULATIONS.....	11-6
11.4.1 Calculation of Chlorobenzene Emissions and DRE.....	11-7
12.0 ROUTINE MAINTENANCE PROCEDURES AND SCHEDULES.....	12-1
13.0 ASSESSMENT PROCEDURES FOR ACCURACY, PRECISION, AND COMPLETENESS.....	13-1
13.1 PRECISION.....	13-1
13.2 ACCURACY.....	13-1
13.3 COMPLETENESS.....	13-2
14.0 AUDIT PROCEDURES, CORRECTIVE ACTION AND QA REPORTING.....	14-1
14.1 PERFORMANCE AUDITS.....	14-1
14.2 SYSTEM AUDITS.....	14-1
14.2.1 Field Audit.....	14-1
14.2.2 Laboratory Audit.....	14-2
14.3 CORRECTIVE ACTION.....	14-2
15.0 REFERENCES.....	15-1

LIST OF ANNEXES

- ANNEX A.** QA/QC OBJECTIVES FOR ANALYTICAL METHODS
- ANNEX B.** EXAMPLE DATA FORMS
- ANNEX C.** RESUMES OF KEY INDIVIDUALS

LIST OF TABLES

A-6-1	EXHAUST GAS SAMPLING SUMMARY	6-6
A-6-2	PROCESS SAMPLES TO BE COLLECTED.....	6-12
A-7-1	SAMPLE PRESERVATION AND HOLDING TIMES	7-2
A-8-1	SUMMARY OF CEMS PERFORMANCE CHECK REQUIREMENTS	8-3
A-9-1	ANALYTICAL METHODS	9-2
A-9-2	NUMBER OF SAMPLES	9-2
A-9-3	TOTAL VOC TARGET ANALYTE LIST FOR PROCESS SAMPLES	9-5
A-9-4	TOTAL SVOC TARGET ANALYTE LIST FOR PROCESS SAMPLES.....	9-6
A-9-5	VOLATILE ORGANIC COMPOUND TARGET ANALYTE LIST FOR METHOD 5041A	9-9
A-9-6	PCDD/PCDF TARGET ANALYTE LIST	9-11
A-9-7	METHOD 29 TARGET ANALYTE LIST	9-13
A-10-1	CALIBRATION PROCEDURES FOR ANALYTICAL METHODS.....	10-3
A-11-1	CHLOROBENZENE EMISSIONS CALCULATION DATA	11-7

LIST OF FIGURES

A-4-1	ATLIC STB ORGANIZATION CHART.....	4-2
-------	-----------------------------------	-----

LIST OF ACRONYMS AND ABBREVIATIONS

ACA	Absolute Calibration Audit
ACAMS	Automatic Continuous Agent Monitoring System
ASTM	ASTM International
ATB	Agent Trial Burn
ATLIC	Area 10 Liquid Incinerator
AWFCO	Automatic Waste Feed Cutoff
Brine	Wet Scrubber Recirculation Brine
CAL	Chemical Assessment Laboratory
CAR	Contract Administrative Representative
CC	Correlation Coefficient
CCV	Continuing Calibration Verification
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain-of-Custody
CPT	Comprehensive Performance Test
CVAAS	Cold Vapor Atomic Absorption Spectroscopy
DAAMS	Depot Area Air Monitoring System
DAQ	State of Utah, Department of Environmental Quality, Division of Air Quality
DEQ	State of Utah, Department of Environmental Quality
DCD	Deseret Chemical Depot
DLS	Deactivation Furnace System
DI	Deionized (as in deionized water)
DQO	Data Quality Objective
DRE	Destruction and Removal Efficiency
DSHW	State of Utah, Department of Environmental Quality, Division of Solid and Hazardous Waste
EG&G	EG&G Defense Materials, Inc.
EPA	U.S. Environmental Protection Agency
ER	Emission Rate
FCS	Facility Control System
GC/MS	Gas Chromatograph/Mass Spectrometer
HHRA	Human Health Risk Assessment
HRGC/HRMS	High Resolution Gas Chromatograph/High Resolution Mass Spectrometer
HWC	Hazardous Waste Combustor
IC	Ion Chromatograph
ICP/MS	Inductively Coupled Plasma/Mass Spectrometer
ICV	Initial Calibration Verification

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

LIC	Liquid Incinerator
LCS	Laboratory Control Sample
LOQ	Limit of Quantitation
MAC1	Maximum Achievable Control Technology
MDL	Method Detection Limit
MPF	Metal Parts Furnace
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PCC	Primary Combustion Chamber
PM	Particulate Matter
POHC	Principal Organic Hazardous Constituent
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
%R	Percent Recovery
RA1A	Relative Accuracy Test Audit
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
RRF	Relative Response Factor
RSD	Relative Standard Deviation
SCC	Secondary Combustion Chamber
SMVOC	Sampling Method for Volatile Organic Compounds
SOP	Standard Operating Procedure
Spent decon	Spent Decontamination Solution
STB	Surrogate Trial Burn
STC	Sampling Team Coordinator
SVOC	Semi-Volatile Organic Compounds
SW-846	Test Methods for Evaluating Solid Waste, 3rd Edition including Update III, USEPA, SW-846, December 1996.
TEF	Toxic Equivalency Factor
TE-LOP	Tooele Laboratory Operating Procedure
TEQ	Toxic Equivalent Concentration
THC	Total Hydrocarbons
TIC	Tentatively Identified Compound
TOCDEF	Tooele Chemical Agent Disposal Facility
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

LIST OF UNITS AND MEASUREMENTS

acfm	actual cubic feet per minute
amu	atomic mass unit
cfm	cubic feet per minute
°C	degree centigrade
°F	degree Fahrenheit
dscf	dry standard cubic foot
dscfm	dry standard cubic feet per minute
dscm	dry standard cubic meter
dsL	dry standard liter
ft	foot
g	gram
g/sec	grams per second
gal	gallon
gpm	gallons per minute
gr/dscf	grains per dry standard cubic foot (1 atmosphere, 68 °F)
ΔH	average pressure differential across orifice meter
inHg	inches of mercury
inWC	inches of water column
kg	kilogram
L	liter
L/min	liters per minute
μg	microgram
m	cubic meter
mg	milligram
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
min	minute
mL	milliliter
mL/min	milliliters per minute
N	Normal
ng	nanogram
ppb	parts per billion
ppm	parts per million
ppmdv	parts per million on a dry volume basis
lb/hr	pounds per hour
psig	pounds per square inch gauge
ΔP	pitot velocity pressure
Wt%	weight percent
Y _c	dry gas meter calibration factor

LIST OF CHEMICAL SYMBOLS AND FORMULAS

Agent GA	Ethyl N,N-dimethyl phosphoramidocyanidate
Al	aluminum
Ag	silver
As	arsenic
B	boron
Ba	barium
BFB	4-bromofluorobenzene
Be	beryllium
Cd	cadmium
Cl ₂	chlorine
CO ₂	carbon dioxide
CO	carbon monoxide
Co	cobalt
Cr	chromium
Cu	copper
DFTPP	decafluorotriphenylphosphine
HNO ₃	nitric acid
Hg	mercury
HCl	hydrogen chloride
H ₂ O ₂	hydrogen peroxide
KMnO ₄	potassium permanganate
Mn	manganese
NaOH	sodium hydroxide
Na ₂ S ₂ O ₃	sodium thiosulfate
H ₂ SO ₄	sulfuric acid
Ni	nickel
O ₂	oxygen
Pb	lead
PCDD	polychlorinated dibenzo-p-dioxin
PCDF	polychlorinated dibenzofuran
Sb	antimony
Se	selenium
Sn	tin
TCDD	tetrachlorodibenzo-p-dioxin
Tl	thallium
V	vanadium
Zn	zinc

3.0 PROJECT DESCRIPTION

The Tooele Chemical Agent Disposal Facility (TOCDF) was designed and built for the U.S. Army as a hazardous waste incinerator facility to destroy the chemical munitions stockpile at the Deseret Chemical Depot (DCD), which is 20 miles south of Tooele, Utah. The incinerator system is designed to dispose of chemical agents (GB, VX, H-series mustard), drained munitions, contaminated refuse, bulk containers, liquid wastes, explosives, and propellant components. As the DCD is scheduled for closure, the destruction of the remaining nerve Agent GA and the blister agent Lewisite is necessary to complete the destruction of all the chemical agents in storage at DCD. The destruction of these additional chemical agents has been contracted to EG&G Defense Materials, Inc. (EG&G), by the United States Army Chemical Materials Agency, and these activities will be conducted in DCD Area 10 in a newly constructed facility.

The TOCDF operates under a Resource Conservation and Recovery Act (RCRA) permit issued pursuant to delegation by the State of Utah, Department of Environmental Quality (DEQ), Division of Solid and Hazardous Waste (DSHW) under the Utah Administrative Code, Section 315. The TOCDF also operates under a Title V Permit from the State of Utah, DEQ, Division of Air Quality (DAQ). Emissions from the TOCDF incinerators are regulated under the joint authority of the Clean Air Act and RCRA. The TOCDF Environmental Protection Agency (EPA) identification number is UT5210090002. Under the requirements of the TOCDF RCRA Permit, the incinerator system must demonstrate an ability to effectively treat any hazardous waste such that human health and the environment are protected, and the Maximum Achievable Control Technology (MACT) rule has set the performance standards that incinerators must meet.

This plan describes the new Area 10 Liquid Incinerator (ATLIC), the fifth incinerator system that TOCDF operates to dispose of the chemical agents stored at DCD. The TOCDF incinerator systems include two Liquid Incinerators (LIC1 and LIC2), the Metal Parts Furnace (MPF), and the Deactivation Furnace System (DFS). The systems are designed to meet the Hazardous Waste Combustor (HWC) MACT regulation performance requirements, which are found in Title 40 of the Code of Federal Regulations, Part 63, Subpart EEE (40 CFR 63, EEE). Combined Agent Trial Burns (ATBs) and Comprehensive Performance Tests (CPTs) have been conducted in the other incinerator systems at the beginning of each new campaign, and similar testing will be conducted in the ATLIC for processing Agent GA and Lewisite.

This plan describes how TOCDF intends to use surrogate chemicals to demonstrate the combustion of hazardous chemicals in a combined Surrogate Trial Burn (STB) and CPT in the ATLIC, which will be referred to as the ATLIC STB. (The ATLIC Lewisite Demonstration Test will demonstrate the processing of increased concentrations of arsenic and mercury present in the Lewisite and will be addressed in a separate plan.) This plan also serves as notification that TOCDF plans to conduct a CPT for the ATLIC. The feed rates, flows and temperatures demonstrated during the ATLIC STB will be used to set limits and operating parameters when the testing is completed.

This Quality Assurance Project Plan (QAPP) describes the sampling and analytical activities that will be performed by the sampling subcontractor and laboratory during the ATLIC STB. The QAPP was developed using methods from SW-846 (1) and guidance from EPA Region 6 (2).

EG&G is responsible for operating TOCDEF and conducting the AIBs. In addition, EG&G is the principal data user and decision maker for the ATLIC STB, but will subcontract out the sampling and analysis portions of this STB. This subcontracted support will include gas sampling performance, selected process samples collection, samples transportation to the laboratory, sample analyses, the Quality Assurance/Quality Control (QA/QC) associated with these tasks, and results reporting. The subcontractor will provide in-process approvals with final acceptance and approval by EG&G. EG&G will be responsible for the collection of certain monitoring information, the collection and analysis of feed samples, the collection of system operating data, and preparation of the final report.

The exhaust gas will be tested for the following substances during the ATLIC STB:

- Oxygen (O₂), carbon monoxide (CO), and carbon dioxide (CO₂);
- Particulate matter (PM);
- Hydrogen chloride (HCl) and chlorine (Cl₂), also referred to as the halogens;
- Nitrogen oxides (NO_x);
- Metals;
- Volatile Organic Compounds (VOCs);
- Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs); and
- Total Hydrocarbons (THCs).

The Principle Organic Hazardous Constituent (POHC) will be chlorobenzene, which will be sampled as a VOC. The chlorobenzene data will be used to verify that the ATLIC can demonstrate 99.99 percent Destruction and Removal Efficiency (% DRE) or greater for chlorobenzene. The VOC analyses will be performed using SW-846, Methods 5041A/8260B (1), for all performance runs. The PCDDs/PCDFs will be sampled using Method 0023A (1) and analyzed using Method 8290 (1).

The exhaust gas will be analyzed for the elements used in the Human Health Risk Assessment (HHRA), which are: aluminum (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), lead (Pb), manganese (Mn),

mercury (Hg), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), tin (Sn), vanadium (V), and zinc (Zn).

Samples of the surrogate mixture feed will be analyzed for chlorobenzene, tetrachloroethene, and HHRA metals. Samples of the wet scrubber recirculation brine (Brine) and spent decontamination solution (spent decon) will be analyzed for VOCs, Semi-Volatile Organic Compounds (SVOCs), PCDDs/PCDFs, and HHRA metals.

The ATLIC STB Plan is designed to demonstrate the DRE that, under normal operating conditions, will apply during the actual Agent GA and Lewisite destruction. Project scheduling is found in the STB Plan and will be updated as necessary. An example of a daily sample run schedule is in Section 6.0. Data Quality Objectives (DQOs) for each method are found in Annex A to this QAPP. Individual project and quality records are identified herein. Examples of the Calibration Data Sheets, Isokinetic Run Sheets, and Chain-of-Custody (COC) Records are found in Annex B. Annex C contains resumes of the key individuals for this project, and the DAQ and DSHW will be updated when any changes occur.

4.0 PROJECT ORGANIZATION

The ATLIC STB organization is summarized in Figure A-4-1. This organization has three groups that work together for the successful completion of this STB. One group is the EG&G organization, the second is the Battelle Chemical Assessment Laboratory (CAL), and the third is the sampling and analysis subcontractors. This project management structure anticipates the direct, personal responsibility for each task and provides the mechanism for review and corrective action. The direct supervisory line of responsibility also provides for flexibility and timely action to correct problems. The EG&G Contract Administrative Representative (CAR) will interface with the subcontractor organization and the CAL. The EG&G Test Director has the overall responsibility for this STB, and as such, is the point of contact between EG&G Operations and the STB organization. Annex C contains copies of the resumes of the key individuals involved in the ATLIC STB. If any subcontractors for the ATLIC STB change, resumes for the new subcontractor's key individuals will be provided to DAQ and DSHW.

4.1 TEST DIRECTOR AND CONTRACT ADMINISTRATIVE REPRESENTATIVE

The Test Director is an employee of EG&G and has the overall responsibility for the conduct of the ATLIC STB. The Test Director will also serve as the CAR and has the responsibility of oversight of the subcontractors to ensure that they perform as directed by the QAPP and their contract. The CAR coordinates the activities of EG&G, Monitoring personnel, CAL personnel, and the sampling subcontractor. In addition, the Test Director will coordinate the information to be provided in the final ATLIC STB Report. The duties of the Test Director include:

- Ensuring that the feed is prepared for the STB.
- Establishing the system operating parameters as described in the ATLIC STB plan.
- Determining when Operations is ready to begin the performance run.
- Notifying the sampling subcontractor to begin sampling.
- Determining whether the performance run is acceptable from an EG&G perspective.

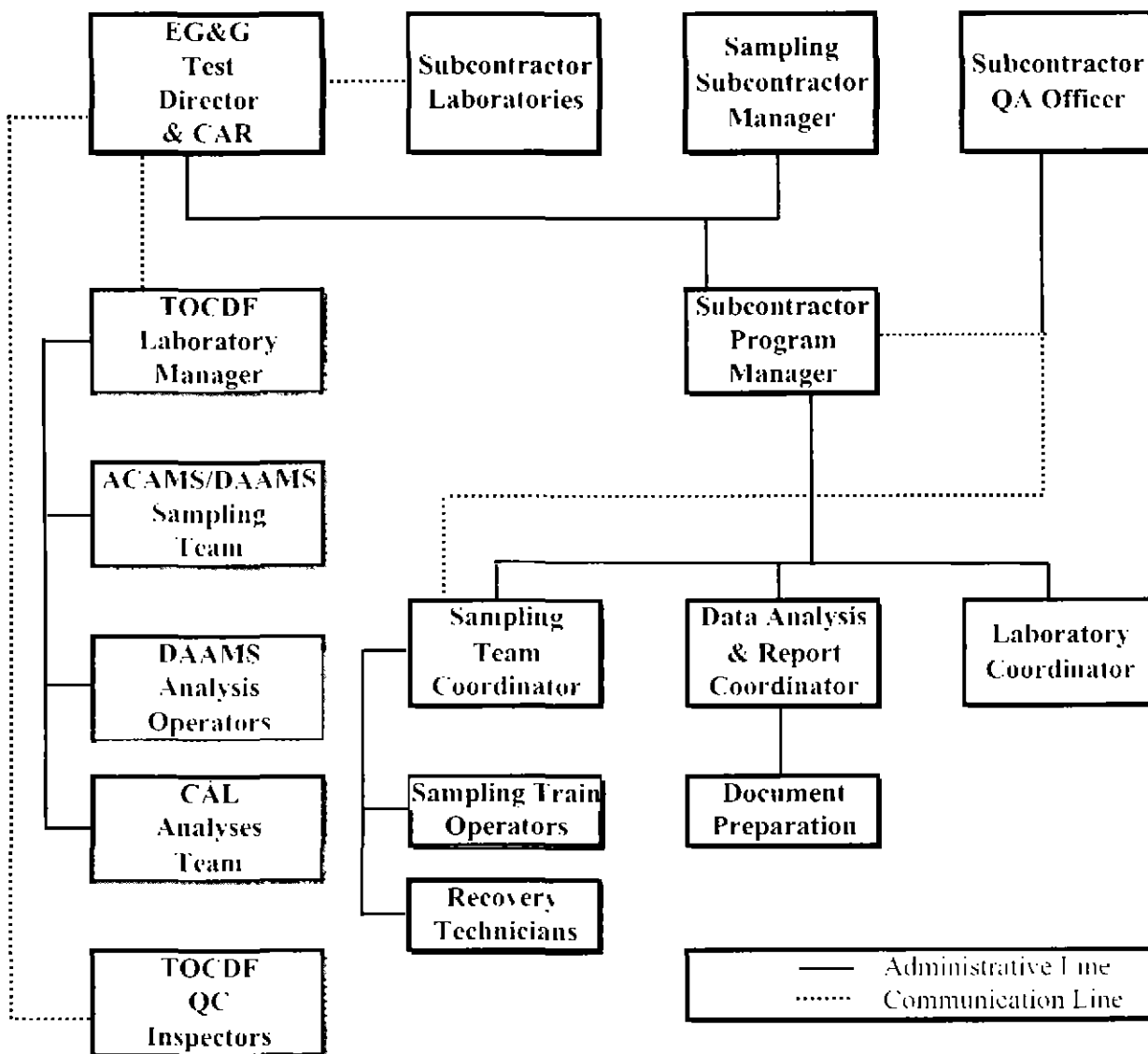


FIGURE A-4-1. ATLIC STB ORGANIZATION CHART

4.2 TOCDF LABORATORY MANAGER

The TOCDF Laboratory Manager is a Battelle employee who manages both the Monitoring group and the CAL. The Monitoring group has the responsibility for the Automatic Continuous Agent Monitoring System (ACAMS) Sampling Team, the Depot Area Air Monitoring System (DAAMS) Sampling Team, and the Continuous Emission Monitoring System (CEMS) Monitoring Team. In addition, the CAL has the responsibility for the agent screening analyses and the Battelle QC Inspectors. The Laboratory Manager is specifically responsible for:

- Tracking samples through the CAL.
- Archiving the analytical data generated by the CAL.
- Providing the QC performed in support of the analyses.

4.3 SUBCONTRACTOR PROGRAM MANAGER

The Subcontractor Program Manager is an employee of the subcontracted sampling firm. The Subcontractor Program Manager is responsible for:

- Committing the subcontractor resources to the project.
- Resolving problems if they occur.
- Ensuring that the subcontracting firm complies with the QAPP and the contract with EG&G.
- Providing the detailed planning of the sample collection efforts in coordination with the CAR.

4.4 SAMPLING SUBCONTRACTOR QUALITY ASSURANCE OFFICER

The Sampling Subcontractor QA Officer manages the QA/QC for the project. He reports to the Sampling Subcontractor Management and is responsible for:

- Overseeing the overall QA/QC for the sampling subcontractor portion of the STB.
- Assisting in the development of the data evaluation report for the STB.
- Enforcing the protocols of the QAPP.

- Observing all on-site activities to ensure that the QAPP is followed.
- Coordinating with the Sampling Team Coordinator (STC) on observation of field sample collecting.

4.5 SAMPLING TEAM COORDINATOR

The STC is a sampling subcontractor employee who is responsible for:

- Managing on-site work by subcontractor employees.
- Completing the data collection for lab analyses, gas sampling data, emission calculations, and results reporting.
- Delivering samples to the laboratory.
- Overseeing the required sampling.
- Directly supervising the gas sampling teams, providing:
 - Equipment;
 - Transportation;
 - Set up;
 - Calibration;
 - Sample train operations;
 - Pre- and post-test leak checks;
 - Isokinetic checks; and
 - Gas sample recovery.

The CAR will be available to coordinate with the STC, including discussing changes in any sampling or analytical procedures.

4.6 SUBCONTRACTOR SAMPLING TEAM MEMBERS

These team members are sampling contractor employees. Each team will include a team leader and technician. The leader will be responsible for operation of the test equipment, QA/QC, and record keeping for the assigned train. The team leader reports any irregularities to the STC, and the STC will report any sampling problems to the EG&G CAR and the Subcontractor Program Manager.

4.7 SUBCONTRACT LABORATORIES

The subcontracted laboratories will verify and document that the incoming field samples match the COC and analysis request forms. They will be responsible for tracking the samples through the laboratory and performing the appropriate tasks to meet the QC requirements outlined in the QAPP. In addition, the laboratories will be responsible for archiving the laboratory data that they generate.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL OBJECTIVES

The overall objective of the measurement data for the ATLIC STB is to demonstrate compliance with the RCRA Permit, Title V Permit, and MACT emission limits while demonstrating at least a 99.99 % DRE for chlorobenzene. To assess the quality of the data, a series of DQOs have been set for each method used for the analysis of samples collected during this STB. The DQOs, summarized in Annex A, will be used to evaluate the data generated during the STB. The data quality indicators produced to meet the DQOs will be evaluated against the data acceptance criteria identified in Annex A. These criteria identify the target precision and accuracy limits that are used to assess the data quality. Annex A was developed using the criteria from the Region 6 guidance (2), EPA QA/G-5 (3), the QA/QC Handbook (4), and SW-846 (1).

The Sampling Subcontractor QA Officer will review the STB field data. A complete assessment of the DQOs will be included in the STB report. The data quality will be discussed with regard to the planned DQOs and the overall project objectives. Data that are outside the QC limits will be evaluated relative to the overall project objectives to determine their impact on defining system performance. A discussion of this evaluation will be included in the STB report. Several procedures will be used for monitoring the precision and accuracy objectives of the analytical program. These procedures include:

- Sampling and analytical activities that will follow standard, referenced procedures whenever possible.
- Calibration standards, internal standards, laboratory control standards, and surrogate compounds that will be high-purity, commercially-available materials.
- Analytical instruments that will be calibrated per the reference method requirements prior to sample analysis to demonstrate that accurate performance levels are being met.
- Data precision and accuracy assessed by evaluating the results from the analysis of internal standards, laboratory blanks, calibration check standards, reagent blanks, method blanks, field and trip blanks, duplicate samples, and matrix or surrogate spiked samples.

Sections 6.0 and 10.0 describe the project-specific QC sample types that will be analyzed, and list the sampling and analytical methods to which they will be applied. When analytical QC procedures reveal that a measurement error has exceeded the DQOs, the source of the deviation will be identified, and corrective action will be taken as described in Annex A. If data fall outside the DQOs for precision and accuracy, even after corrective action has been taken, those data points will be flagged and discussed specifically in the data validation report. Alternative procedures (either sampling or analytical) will be considered and recommended to the CAR when necessary. Any changes or additions will be submitted to the DAQ and DSHW for approval as soon as the need is identified.

5.1 EVALUATION OF PRECISION

Estimates of precision are different for each method, and method-specific precision DQOs are listed by method in Annex A. Estimates of variability levels for replicate measurements of the same parameters are expressed in terms of Relative Percent Difference (RPD) for duplicate samples and as Relative Standard Deviation (RSD) when three or more data points are being compared. Section 13.1 discusses how the estimates of method precision will be calculated.

Some analyses require the evaluation of a larger data set, in which case, precision will be reported as RSD. Examples of large data sets that will be used to evaluate precision include surrogate spikes for VOC determinations. When the analytical results approach the detection limit, precision often is affected adversely because of the enhanced uncertainty of determinations at the lower end of the method applicability. For those determinations near the method detection limit, the precision estimates that are outside the target DQOs will be flagged as estimated measurements. In cases where duplicates are performed, and one result is less than the Limit of Quantitation (LOQ), the average will be calculated using the LOQ; the result reported will be flagged to explain that the precision was not calculated. Precision data will be calculated and presented in the data validation report.

Calculation of the precision for each analysis will be based on different criteria outlined in the QA/QC Handbook (4) and the analytical methods. The precision for the halogen samples will be determined by the RPD calculated from the analysis of the Matrix Spikes and Matrix Spike Duplicates (MS/MSD). The MS/MSD will be used because the field samples have a history of very low concentrations. The precision of the Sampling Method for Volatile Organic Compound (SMVOC) samples will be based on the RSD calculated from the Laboratory Control Sample (LCS) analysis. The results of the analysis of spiked samples will be used because of the historically-low concentrations of field samples. Precision for the metals emission samples will be based on the RPD of the LCS and duplicate analyses of one emission sample. Precision data for metals in the process samples will be based on MS/MSD and duplicate samples. The estimate for precision for the CEMS data will be as required by the CEMS Monitoring Plan in Attachment 20 to the TOCDE permit (5) for the ATLIC CEMS and 40 CFR 60, Appendix A, methods for the sampling subcontractor CEMS.

5.2 EVALUATION OF ACCURACY

Accuracy will be expressed as a percent recovery (%R) for each method. The standard used to measure the %R is method dependent (see tables in Annex A). Additional audit samples may be submitted by DSHW and will act as an independent measure of accuracy. Analysis of an LCS will be assessed as a measure of accuracy; matrix effects on accuracy will be assessed using MS/MSD. A combination of LCS and MS/MSD analyses will be used to evaluate the accuracy of most analysis methods. An evaluation of the accuracy of organic compound analyses that use a gas chromatograph/mass spectrometer (GC/MS) will include the recovery of surrogate

compounds spiked into each sample. Section 13.0 provides the accuracy calculations. Accuracy data will be presented in the data validation report.

An assessment of accuracy on the SMVOC will include an evaluation of the analysis of the Tenax® traps and the Anasorb®-747 traps analyzed separately to determine possible compound breakthrough to the Anasorb®-747 portion of the sampling train. The analysis of an Anasorb®-747 trap should indicate less than 30 percent of the compound concentration that is collected by the front two Tenax® traps. Breakthrough of the compound to the Anasorb®-747 above this level may indicate a loss of the collection efficiency and result in a negative bias in the analytical result. This criterion does not apply when less than 75 nanograms (ng) are detected on the Anasorb®-747 tube.

Calculation of the accuracy for each analysis will be based on different criteria taken from the QA/QC Handbook (4) and the analytical methods. Determinations of accuracy calculations will be as follows:

- For halogen samples, by the %R calculated from the analysis of the MS/MSD.
- For SMVOC samples, based on the %R calculated from the analysis of the LCS.
- For metals emission samples, based on the analysis of the LCS.
- For PCDD/PCDF analyses, taken from the LCS data.
- For the CEMS, as directed by Attachment 20 (5). (The TOCDEF CEMS are certified on an annual basis. This certification involves the measurement of calibration drift, response time, calibration error, and accuracy as measured against a known standard gas.)

5.3 EVALUATION OF COMPLETENESS

Data completeness represents the percentage of valid data collected from a measurement system as compared to the total amount expected to be obtained under optimal or normal conditions. The completeness DQO for the ATLIC STB will be to obtain representative results for all analytical parameters while operating the unit at the desired test specifications for a total of three test runs. The completeness DQO (100 percent completeness) will be met if valid test runs are obtained. Samples resulting from runs that are judged to be invalid based on field indicators of incinerator performance (or aborted runs) will not be submitted to the laboratory for analysis and are not considered to be a part of the sample completeness objective. Sampling runs will be repeated until three runs are successfully completed. The impact of any occurrence of sample loss will be assessed against the objective of obtaining valid runs and will be discussed in the ATLIC STB Report.

5.4 DETECTION AND REPORTING LIMITS

The laboratories will prepare Method Detection Limit (MDL) and LOQs for parameters to be analyzed for the STB using the laboratory's standard operating procedures and the analytical methods referenced in this document. These limits will be compared to the actual analytical results in the final report. Analytes not detected in the analyses will be reported as less than (<) the LOQ. Analytes detected with a concentration between the MDL and the LOQ will be qualified as an estimate and reported. The laboratory conducting the analysis will determine the MDLs and LOQs. The LOQs for the STB parameters are included in Annex A.

5.5 REPRESENTATIVENESS AND COMPARABILITY

Representativeness is defined as "the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, process condition, or an environmental condition." Comparability is defined as "expressing the confidence with which one data set can be compared to another" as discussed in EPA QA/G-5 (3).

The usefulness of the data is contingent upon meeting the criteria for representativeness and comparability. Wherever possible, reference methods and standard sampling procedures will be used. The representativeness DQO is that all measurements be representative of the media and operation being evaluated. The detailed requirements for each parameter given in their respective methods will be followed to ensure representative sampling.

The comparability DQO is that all data resulting from sampling and analysis be comparable with other representative measurements made by the sampling subcontractor or another organization on this or similar processes operating under similar conditions. The use of published sampling and analytical methods, and standard reporting units will aid in ensuring the comparability of the data.

6.0 SAMPLING AND MONITORING PROCEDURES

The ATLIC must demonstrate an ability to effectively incinerate the surrogate mixture such that human health and the environment are protected. The HWC MACT Limits establish the criteria against which applications for permits must be measured. The ATLIC STB will demonstrate that the operating parameters meet the required performance standards, and comply with the regulations. The STB will be considered successful when identified analysis and DRE fall within parameters stated in this QAPP.

This section describes the process and exhaust gas sampling procedures to be performed and the equipment to be used during the ATLIC STB. The sample types, sampling locations, and sample collection procedures will also be discussed. The sampling subcontractor will utilize EPA-approved sampling methods, if available, for the selected analytes. Any proposed modifications to approved methods or procedures will be presented to the DAQ and DSHW for approval prior to implementation and will be documented in the final report.

Standard sampling equipment that meets EPA guidance will be used to collect the exhaust gas and process samples. An independent peer review is not included as part of this scope of work. A final readiness review will be performed by the subcontractor to ensure that the subcontractor has the appropriate manpower, equipment, and training in place before the start of this STB.

6.1 PRE-SAMPLING ACTIVITIES

Many pre-sampling activities need to be completed before sampling can begin. These tasks include equipment calibration, glassware preparation, sample media preparation, team meetings, equipment packing and shipment, equipment setup, and finalization of all the miscellaneous details leading up to the coordinated initiation of the sampling program.

6.1.1 Calibration of Process Monitoring Equipment

Calibration of the process control instruments is required on a regular basis. The calibration status of the ATLIC process control instruments at the time of the STB will be included in the ATLIC STB Report. The calibration frequency for the process control instruments is summarized in Table 2-2 of the ATLIC STB plan.

6.1.2 Sampling Equipment Calibration

Section 8.0 discusses the calibration procedures for the sampling equipment.

6.1.3 Glassware Preparation

The only consumables used in the ATLIC STB sampling will be the sample bottles, and the reagents used in the impingers and for recovery of the samples. The sample containers will be purchased pre-cleaned to meet EPA criteria for clean containers, per specific container type and purpose; a certificate will be provided with the containers to document compliance with these specifications. Sample train glassware and sample containers require specialized cleaning to avoid sample contamination from the collection containers or sampling equipment. Cleaning procedures for the sample train glassware are summarized below:

- Method 5/26 glassware and containers: hot water rinse; hot, soapy water wash; water rinse; deionized (DI) water rinse; acetone rinse; and air dry.
- Method 0023A glassware and containers: hot, soapy water wash; water rinse; DI water rinse; 400 °C heating for two hours; methylene chloride rinse; toluene rinse; and rinse with acetone and methylene chloride.
- Method 29 glassware and containers: hot water rinse; hot, soapy water wash; water rinse; 10 percent nitric acid soak; DI water rinse; acetone rinse; and air dry.
- Method 0031 glassware and containers: soap and water wash; DI water rinse; and oven dry at 150 °C for two hours. (SMVOC tubes prepared by Method 0031.)

6.1.4 Sample Media Preparation

Reagents used in the laboratory are normally of analytical reagent grade, or higher, purity. Reagents will be labeled with the date received and the date opened. Reagent purity will be checked by collection of the appropriate blanks. All filters will be desiccated and properly tare-weighted prior to use.

The SMVOC tubes will be supplied to the sampling subcontractor by the laboratory just prior to the field effort. Sorbents used for Method 0031 sampling will be prepared using two different methods. The Tenax® tubes will be conditioned at 225 °C ($\pm 10^\circ\text{C}$) with a $\geq 100\text{-mL/min}$ flow of ultra-high-purity helium or nitrogen. The Anasorb®-747 tubes will be conditioned at 300 °C ($\pm 10^\circ\text{C}$) with a $\geq 100\text{-mL/min}$ flow of ultra-high-purity helium or nitrogen. Tubes will then be placed into 25- by 150-mm. clean culture tubes while still hot. Each batch of SMVOC tubes will be verified clean by a GC/MS analysis. A blank Tenax® cartridge will be thermally desorbed into the GC/MS. The Tenax® will not be considered acceptable if more than 50 ng of any target analytes are found. An Anasorb®-747 cartridge will be analyzed by GC/MS and evaluated using the same criteria.

The XAD-2® traps and filters will be supplied to the sampling subcontractor by the laboratory just prior to the field effort. The XAD-2® resin traps will be cleaned and conditioned as directed in the methods. An analysis of each batch of XAD-2® resin will be provided before use as a QA/QC step. The resin used for the PCDD/PCDF sampling will be analyzed using a High Resolution Gas Chromatograph/High Resolution Mass Spectrometer (HRGC/HRMS) to ensure that the resin is contaminant free.

6.1.5 Additional Pre-Sampling Activities

Prior to mobilization of the field program, a sample team meeting will be held to designate responsibilities to each team member for the ATLIC STB. Assignments will be made based on individual experience and the relative importance of the assigned task. Site setup will be the final pre-sampling activity. This task involves positioning the sampling equipment in the sampling area. During setup, preliminary measurements will be taken to determine exhaust gas moisture and flow rate. Preliminary exhaust gas moisture will be determined in accordance with EPA Method 4 (6), and preliminary flow rate measurements will be conducted using Methods 1 and 2 (6). These data will be used to calculate the appropriate nozzle size and sample flow rate to be used to accomplish isokinetic sampling.

6.2 FIELD QUALITY CONTROL ACTIVITIES

The QC checks for the process data collection and sampling aspects of this program will include, but are not limited to:

- Using standardized forms and field notebooks to ensure completeness, traceability, and comparability of the process information and samples collected.
- Field checking standardized forms to ensure accuracy and completeness.
- Strictly adhering to the sample traceability procedures (i.e., COC) outlined in Section 7.2.1.
- Submitting field-biased blanks.
- Leak checking sample trains before and during port change and after sample collection.

6.2.1 Reagent Blanks

Reagent blanks will be prepared by collecting reagents used in the sampling and recovery of the exhaust gas samples. Reagent blanks are defined as samples of the reagent source water, solvents, solutions, and other media used for sample collection. Reagent blank samples of 0.1 Normal (N) sulfuric acid (H_2SO_4), 0.1 N sodium hydroxide (NaOH), acetone probe rinse

solvent, and the particulate filter will be collected for the Method 5/26 trains. The following reagent blank samples will be collected for the Method 29 train: 0.1 N nitric acid (HNO_3) probe rinse solution, particulate filter, 5 percent HNO_3 and 10 percent hydrogen peroxide (H_2O_2) impinger solution, 4 percent potassium permanganate (KMnO_4) and 10 percent H_2SO_4 , and 8 N HCl .

The following reagent blanks will be collected for the Method 0023A trains: acetone, methylene chloride, and toluene solvent rinses, particulate filter, and DI impinger water. Each reagent blank will be analyzed for the same analytical parameters as the actual ATLIC STB samples. The results from the analyses of these blanks will be used to demonstrate that these solvents, solutions, and filters are not potential sources of background contamination for sample collection and recovery.

6.2.2 Field Blanks

Field blank samples will be collected during the ATLIC STB to provide a QC check on sample handling. Field blanks contain all the reagents used during the sample collection process. The field blank will be a sampling train assembled in the field, leak checked, let stand for the sample time, and then recovered as other trains. Field blank samples will be placed in appropriately-cleaned and sized sample containers in the field and handled in the same way as actual field samples, and analyzed by the same methods as the field samples. The DAQ and DSHW will be notified when the field blanks will be collected to allow them the opportunity to observe.

6.2.3 Trip Blanks

Trip blanks will be used to check for contamination resulting from the shipping and transport of the samples to the laboratory. Trip blanks will consist of a set of clean, sealed SMVOC resin tubes and a pair of Volatile Organic Analysis (VOA) vials filled with ASTM Type II DI water. These tubes and vials are transported from the analytical laboratory to the field site and returned to the laboratory for storage and analysis along with the field test samples. The trip blank data will demonstrate that the samples are not exposed to fugitive contamination during storage and transport. Trip blanks are analyzed for the same analytical parameters as the actual test samples, and will demonstrate good quality of background if the compound concentrations detected are \leq LOQ, as specified in the QA/QC Handbook (4).

6.2.4 Field Duplicates

Duplicate samples of the surrogate mixture, Brine, and spent decon will be collected during one performance run as a QC step.

6.3 EXHAUST GAS SAMPLING

The exhaust gas sampling will be conducted by EG&G and a subcontractor. The sampling will take place in the ATLIC exhaust stack. Monitoring with the ATLIC CEMS will be conducted by EG&G for CO, O₂, and NO_x. The sampling subcontractor will sample for PM, HCl, Cl₂, metals, VOCs, and PCDDs/PCDFs. Monitoring for O₂, CO₂, and THC will be done with CEMS operated by the sampling subcontractor. An exhaust gas molecular weight will be calculated from the subcontractor CEMS data or by manual reference methods.

Sampling will begin when the incinerator has reached steady-state operations on waste feed, and a run will not be started after 2:00 p.m. The Test Director or a designated representative will authorize the STC to begin sampling. Sampling will be stopped if the waste feed is stopped. To restart sampling, the surrogate mixture feed will be burned for 15 minutes, and if operating parameters are steady, sampling will be restarted.

Sampling train problems will be analyzed on-site by the STC and the Test Director. If it can be shown that the samples collected are not significantly biased and the results are valid, the run will continue. If the decision is made to abort a performance run, the entire set of samples collected for that run will not be analyzed. If any corrective action is required during the field-sampling portion of a program, these actions will be reported to the STC prior to the sampling crew demobilizing from the field. If the STC determines that a run should be repeated, he makes the determination at that point and communicates this requirement to the Test Director. These problems and their resolution will be discussed with the DAQ and DSHW representatives.

Exhaust gas sampling procedures and frequencies to be used during this STB are summarized in Table A-6-1. Sampling port locations for each train are shown in Drawing EGI-22-D-8211 in Attachment 4 to the Permit Modification. Four sampling trains will be used in five different ports in the stack and the exhaust gas samples will be collected over a four hour period. Other parameters will be determined using CEMS as shown in Table A-6-1. The isokinetic trains will determine the gas flow rate and the moisture concentration. Leak checks of the sample trains will be conducted in accordance with the protocol in each method prior to sampling, during port change, and at the conclusion of sample collection. The DAQ and DSHW will have the option of observing these leak checks.

The four trains and constituents to be sampled are:

- Method 5/26 (6) for PM, HCl, and Cl₂;
- Method 29 (6) for HHRA metals;
- Method 0023A (1) for PCDDs/PCDFs; and
- Method 0031 (1) for VOCs.

TABLE A-6-1. EXHAUST GAS SAMPLING SUMMARY

Sampling Train	Analyses Performed	Sampling Method Reference	Number Of Samples Collected during the ATLIC STB (3 Runs)
Method 1	Traverse Points	40 CFR 60, Appendix A	1
Method 2	Duct Velocity	40 CFR 60, Appendix A	With each isokinetic train
Isokinetic Trains	Exhaust Gas Moisture	40 CFR 60, Appendix A	With each isokinetic train
Method 5	PM	40 CFR 60, Appendix A	3 samples & 1 field blank
Method 26A	HCl and Cl ₂	40 CFR 60, Appendix A	3 sample sets & 1 field blank
Method 29	HHRA Metals	40 CFR 60, Appendix A	3 sample sets & 1 field blank
Method 0031	VOCs	SW-846, Method 0031	12 trap pairs, 3 field blank pairs, & 1 trip blank pair
Method 0023A	PCDDs PCDFs	SW-846, Method 0023A	3 sample sets & 1 field blank
CEMS	O ₂ , CO, and NO _x	Attachment 20 (5)	Continuously
CEMS	O ₂ , CO ₂ , and THC	40 CFR 60, Appendix A	Continuously

6.3.1 Method 0031 for Volatile Organic Compounds

The VOCs will be sampled using SW-846, Method 0031, "Sampling Method for Volatile Organic Compounds (SMVOC)" (1). The SMVOC draws exhaust gas through a series of three sorbent traps. Four sets of traps will be collected per run. Sampled gas will be passed through each set of traps for about 40 minutes. The sorbent traps will be conditioned as described in Section 6.1.4. The collection of the four sets of traps will result in 160 minutes of sampling, which exceeds the 120 min the method specifies as a minimum.

The SMVOC probe removes exhaust gas from the duct at a probe temperature of $130^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($266^{\circ}\text{F} \pm 9^{\circ}\text{F}$) during sampling. The exhaust gas passes through a condenser and two traps containing about 1.6 grams of Tenax® resin each. The exhaust gas then passes through a knockout flask that collects condensed water. Following that, the gas passes through a second condenser and through the third trap containing about 5 grams of Anasorb®-747. Each water-cooled condenser is arranged so that condensate will drain vertically through the traps. The traps are arranged in series, so the majority of the compounds will be trapped on the Tenax® resin. The Anasorb®-747 in the third trap will retain the gaseous compounds. New Teflon® sample transfer lines will be used for the ATLIC STB, and the sampling train will use greaseless fittings and connectors. The exhaust gas will be sampled at approximately 0.5 L/min (20 L/sample). Analyses of the SMVOC tubes will follow SW-846, Method 5041A (1).

The condensate collected in the SMVOC flask will be transferred to a 40-mL VOA vial with Teflon®-lined septa. The flask will be rinsed three times and the rinseate transferred to the VOA vial. The vial will then be filled to the top with organic-free water. The condensate will be analyzed using Method 8260B.

The laboratory performing the analyses will supply the SMVOC tubes. The tubes contain gas-chromatography-quality Tenax® and Anasorb®-747. These tubes will be used without further cleanup. The tubes will meet the "blank" criteria and will be consistent with the requirements of the method. The supplier will provide an analysis for each batch of SMVOC tubes used.

Extra sorbent tubes will be taken to the sampling site to serve as field blanks and trip blanks. One pair of SMVOC tubes, designated as a field blank, will be removed from their containers, attached to the sampling train, and leak checked. The field blank tubes will be recovered and stored for transport in the same manner as the sample-exposed tubes. A field blank will be collected for each run. One set of tubes will act as a trip blank and will not be opened at the site. All of the blanks will be analyzed by the same method as the actual samples. The SMVOC tubes will be stored at $\leq 10^{\circ}\text{C}$ and away from other samples, both before and after sampling, to minimize potential contamination.

6.3.2 Method 1 to Determine Duct Traverse Sampling Points

The number and location of the exhaust gas sampling points will be determined according to the procedures outlined in Method 1, "Sample and Velocity Traverses for Stationary Sources" (6). The sampling locations and the number of sampling traverse points must meet the criteria specified in EPA Method 1.

6.3.3 Method 2 to Determine Exhaust Gas Velocity and Volumetric Flow Rate

The exhaust gas velocity and volumetric flow rate will be determined using Method 2, "Determination of Stack Gas Velocity and Volumetric Flow (Type S Pitot tube)" (6). Velocity measurements will be made using Type S pitot tubes, which will be calibrated by conforming to the geometric specifications outlined in Method 2 or in a wind tunnel against a standard pitot. The differential pressures will be measured with fluid manometers, and the gas temperatures will be measured with chromel-alumel thermocouples equipped with digital readouts.

6.3.4 Exhaust Gas Moisture Content

The exhaust gas moisture content will be determined in conjunction with each isokinetic sampling train as directed in Method 5 (6). The impingers will be connected in series and will contain reagents as described in the following sections. The impingers will be placed in an ice bath to condense the moisture in the exhaust gas sample. Any moisture that is not condensed in the impingers is captured in the silica gel. Moisture will be determined from impingers' weights.

6.3.5 Combined Method 5/26 for Particulate Matter and Halogens

A combined train will be used to determine concentrations of PM, HCl, and Cl₂. Sample collection will be conducted as directed by Method 5 (6). A quartz-fiber or Teflon® mat filter will be used. The filter will be weighed before sampling and after desiccating as directed in Method 5. *Nozzles, probe liners, and filter holders will be rinsed thoroughly prior to testing.* Samples will be collected for a minimum of four hours.

The impinger configurations used in the train are:

- Impinger 1: Condensate impinger containing 50 mL of 0.1 N H₂SO₄.
- Impingers 2 and 3: Greenburg-Smith impingers containing 100 mL of 0.1 N H₂SO₄.
- Impingers 4 and 5: Modified Greenburg-Smith impingers containing 100 mL of 0.1 N NaOH.
- Impinger 6: Modified Greenburg-Smith impinger containing silica gel.

The sample is withdrawn isokinetically from the exhaust gas, while the temperature of the sample probe and the filter housing are maintained at 248 °F (± 25 °F). The sampling runs will be performed within $\pm 10\%$ of isokinetic conditions. The probe rinse and the material collected in the filter housing will be used to determine the PM emissions. Reagent blanks will be analyzed. The field blank will be collected as directed by the method, and the recovered field blank samples will be analyzed the same as the other trains. This method does not require the sample fractions to be cooled.

An ion chromatograph (IC) will be used to analyze the impinger solutions. The HCl emissions will be determined from the analysis of the H₂SO₄ impinger solutions, and the Cl₂ emissions are determined from the analysis of the NaOH impingers. Chlorine is absorbed by the basic solution and disassociates to form sodium chloride and sodium hypochlorite (NaOCl). The sample recovery of the NaOH impingers will include the addition of sodium thiosulfate (Na₂S₂O₃) to reduce any NaOCl to chloride ion. This will result in 2 moles of chloride ion for each mole of Cl₂ present in the exhaust gas sample.

6.3.6 Method 0023A for PCDDs/PCDFs

Method 0023A (1) will be used to sample the exhaust gas for PCDDs/PCDFs during each performance run. The Method 0023A sample train will collect exhaust gas for four hours. The minimum sample volume collected will be 120 dry standard cubic feet (dscf). The exhaust gas is extracted isokinetically through ports in the horizontal duct using a heated borosilicate glass-lined probe. Sampling train connections are made with Teflon® and glass. The PM is removed by a glass fiber filter housed in a glass filter holder maintained at 248 °F (± 25 °F). For removal of the organic compounds, the sample gas passes through a water-cooled condenser and XAD-2® sorbent trap, which are arranged in a manner that allows the condensate to drain vertically through the XAD-2® trap. The gas temperature at the entrance to the resin trap will be maintained below 68 °F. A chilled impinger train is used to remove water from the exhaust gas, and a dry gas meter will be used to measure the sample gas volume.

Recovery of the Method 0023A samples and assembly of the sample trains will be conducted in a dust-controlled environment of mobile laboratories. The samples will be processed for analysis within the holding time requirements described in Section 7.0. After sample collection, the recovered sample fractions will be cooled at ≤ 4 °C until they are shipped to the laboratory for analysis. Samples received at the laboratory will be combined into two sample fractions for analysis. One fraction will contain the probe rinse and the filter extract with surrogates added to the filter. The second fraction will contain the XAD-2® extract and the back half rinse with field surrogates added to the XAD-2® resin before sampling.

Blanks of each solvent lot used will be saved for potential analysis. A field blank will be prepared and recovered as directed by the method. The field blank will be leak checked and then allowed to sit for the sampling time of the train. The recovered samples will be shipped to the laboratory and analyzed in the same manner as the recovered samples from the other trains.

6.3.7 Method 29 for Metals

Metal emissions will be sampled using Method 29 (6). The setup, pretest preparations, and leak-check procedures are the same as outlined in Method 5 (6). Nozzles, probe liners, and filter holders will be rinsed thoroughly prior to testing. Samples will be collected for a minimum of four hours.

Impinger configurations are:

- Impinger 1: Empty, modified Greenburg-Smith, to serve as a knockout.
- Impinger 2: Modified Greenburg-Smith containing 100 mL of 5 % HNO_3 and 10 % H_2O_2 .
- Impinger 3: Greenburg-Smith containing 100 mL of 5 % HNO_3 /10 % H_2O_2 .
- Impinger 4: Empty, modified Greenburg-Smith.
- Impingers 5 and 6: Modified Greenburg-Smith containing 100 mL each of 4 % KMnO_4 and 10 % H_2SO_4 .
- Impinger 7: Modified Greenburg-Smith containing silica gel.

The sample train will be recovered as directed by Method 29 (6). The front half of the train is rinsed with 0.1 N HNO_3 , including the probe nozzle, probe liner, and front half of the filter holder into a tared sample bottle. When the rinse is complete, the bottle is capped and the weight of rinse is recorded on the field sample recovery sheet. Then 100 mL of acid is placed in a second wash bottle and used to rinse the back half of the filter housing, the transfer line, and the first three impingers. These rinses are added to the impinger contents, the bottles capped, and the weight of acid used in the rinse recorded on the field sample recovery sheet. The fourth impinger will be recovered separately with a 0.1 N nitric acid rinse. Impingers 5 and 6 will be rinsed with KMnO_4 impinger solution, and DI water. These rinses will be combined with the collected impinger catch from these two impingers, which are then rinsed with 8 N HCl ; this rinse is kept separate. Six sample fractions will be analyzed from the Method 29 train. The front-half fraction consists of the acid digestion of the filter and the rinse of the probe, nozzle, and filter holder front half. The back-half fraction consists of the contents of the first three impingers and their rinses along with the rinse of the back half of the filter holder. These two fractions will be analyzed for the HHRA metals. Impinger 4 and its rinse will be analyzed for mercury only. Impingers 5 and 6 and their rinses will be analyzed for mercury only, and the acid rinse of impingers 5 and 6 will also be analyzed separately for mercury only as well. The sample fractions are acid solutions, and the acid will preserve the samples. Method 29 (6) does not require cooling the samples, so they will be shipped without cooling.

The reagent blanks will be prepared as directed by Method 29. The reagent blanks are analyzed to determine if significant amounts of metals are added through the reagents. The reagent blank will be used to make the corrections called for in Sections 12.6 and 12.7 of Method 29.

A field blank will be prepared with the same components as a regular train and recovered using the same reagent amounts. The field blank will be leak checked and then allowed to sit for the sampling time. Recovered samples will be analyzed using the same methods as field samples.

6.3.8 Continuous Emissions Monitoring

The ATLIC CEMS operated by EG&G will be used to monitor the CO, O₂, and NO_x concentrations. The operation, calibration procedures, and preventive maintenance procedures for the CEMS are described in Attachment 20 of the TOCDF RCRA Permit (5), which also describes specific locations, sampling frequencies, and the specific types of instrumentation for each monitoring station. Attachment 20 of the TOCDF RCRA Permit (5) describes the monitoring system that is used to provide continuous operational control of the ATLIC and to meet the requirements listed in the RCRA Permit and Title V Permit. A Relative Accuracy Test Audit (RATA) will be conducted prior to the STB as directed by the HWC MACT regulations.

The CO, O₂, and NO_x CEMS data will be recorded continuously during each test. The sampling ports for the monitors are located in the ATLIC stack. The CO concentration will be determined using monitor 819-AIT-8302, and the O₂ concentration will be determined with monitor 819-AIT-8301. The NO_x concentration will be determined using monitor 819-AIT-8304. These monitors will be checked against reference standards daily at a minimum. Zero and span checks will be considered a verification of the CEMS data quality. If the zero and span checks indicate unacceptable CEMS results for accuracy and precision, then the monitor will be recalibrated according to the manufacturer's specifications. The Facility Control System (FCS) will record the CEMS data, which will be used for O₂ corrections.

Each year, the CEMS are certified by on-site testing and calibrations. Guidelines are delineated in a quality control plan and laboratory operating procedure for each CEMS. In addition to the annual certification, an Absolute Calibration Audit (ACA) will be conducted quarterly as directed by the HWC MACT regulations. The QC plans, including bounds, calibration frequency, and procedures, are discussed in Attachment 20 of the TOCDF RCRA Permit (5). Additional parameters will also be monitored using CEMS operated by the sampling subcontractor. These CEMS will be used to monitor for O₂, CO₂, and THC. The subcontractor will report the data from each of the monitors. An exhaust gas molecular weight will be calculated from the subcontractor CEMS data or by manual reference methods. Each individual CEMS will be calibrated as directed in the respective methods.

6.4 PROCESS SAMPLING

Table A-6-2 lists the sample streams, analyses to be performed, sampling method, sampling frequencies, and sample volumes. The process samples will be collected using ASTM International (ASTM) methods. Liquid samples will be collected from taps provided for sample collection. Field duplicates of the Brine, spent decon, and surrogate mixture samples will be collected during one run.

TABLE A-6-2. PROCESS SAMPLES TO BE COLLECTED

Sample Stream	Analyses Performed	Sampling Method	Sampling Frequency	Sample Volume
Wet Scrubber Recirculation Brine*	pH, HHRA Metals, VOCs, SVOCs, PCDDs/PCDFs,	Tap, ASTM Method D3370	One Sample per Run	Three 40-mL VOA vials, one 500-mL, and two 1-L bottles
Spent Decon Solution*	pH, HHRA Metals, VOCs, SVOCs, PCDDs/PCDFs	Tap, ASTM Method D3370	One Sample per Run	Three 40-mL VOA vials, one 500-mL, and two 1-L bottles
Surrogate Mixture*	HHRA Metals, chlorobenzene, and tetrachloroethene	Tap, ASTM Method D3370	One Sample per Run	Two 250-mL bottles

* One run will have a duplicate set of samples collected

6.4.1 Process Stream Sampling Locations

Process streams sampled as part of the ATLIC STB include the surrogate mixture feed, spent decon, and Brine. Surrogate mixture samples will be collected from a valve in the feed lines. A grab sample of spent decon is taken from the SDS tanks. The contents of the SDS tank will be mixed before collection of the sample. The spent decon samples are collected before the run begins to allow the contents to be agent screened before the spent decon is processed. If additional NaOH or other material is added to the SDS tank, then new samples will be collected.

The Brine samples will be taken via taps on the discharge of the pump used to move the Brine. Samples of the surrogate mixture will be collected from taps on the liquid delivery system at a location that will prevent fluctuations in the delivery pressure or flow of the solution.

6.4.2 Tap Sampling Method

Liquid process samples will be collected using the method described by the ASTM Method D3370 (7). The sample will be collected by attaching a sample line to the tap and flushing the sample line. The flush will be managed in accordance with applicable EPA and DSHW regulations. The sample line is inserted into the sample container, and the tap is opened so that the sample bottle is filled. This sampling flow reduces the loss of volatile compounds from the sampling container prior to closing the container. This method ensures that the actual material collected is representative of the stream. Separate sub-sample bottles are used for each sample. Brine samples will be collected during the final 60 minutes of the run, and other samples will be collected throughout the run. The spent decon samples will be collected before the runs to allow the sample to be analyzed before processing the spent decon.

6.5 PROCESS MONITORING EQUIPMENT

Process electronic data output will be monitored carefully by incinerator operators to maintain steady-state operating conditions during the ATLIC STB. Process monitoring equipment will be inspected and calibrated periodically. EG&G will be responsible for collecting operations data, the permit-required monitoring information, and system operating data in accordance with Standard Operating Procedures (SOPs). The process data to be collected includes:

- Primary Combustion Chamber (PCC) exhaust gas temperature and PCC pressure;
- Secondary Combustion Chamber (SCC) exhaust gas temperature and SCC exhaust gas delta pressure;
- Feed rate;
- Quench brine pressure and Brine pH;
- Quench exhaust gas temperature;
- Venturi delta pressure and venturi Brine flow;
- Brine flow to scrubber and Brine pressure; and
- CO concentration and O₂ concentration;

6.6 POST-SAMPLING ACTIVITIES

Any wastes generated during sample collection will be handled in a safe manner. Liquid wastes will be placed in appropriately-sized containers at a satellite collection point.

7.0 SAMPLE HANDLING, TRACEABILITY, AND HOLDING TIMES

This section describes the sample preservation methods, holding times, field documentation and shipping requirements. Process stream samples will be collected by the sampling subcontractor with the exception of the surrogate mixture samples and the spent decon samples. Exhaust gas samples will be collected by the sampling subcontractor. Surrogate mixture samples and spent decon samples will be collected by EG&G operations personnel, who will label and transport the samples to the CAL for analysis.

7.1 SAMPLE PRESERVATION AND HOLDING TIMES

Requirements for preserving samples and holding times were taken from Table 3-1 in SW-846 (1) and the QC Handbook (4), and are shown in Table A-7-1. The sampling and packaging technicians will preserve the samples as directed by Table A-7-1. Samples requiring cooling will be maintained at $\leq 4^{\circ}\text{C}$ until shipped in a cooler packed with ice, and sample temperatures will be monitored upon receipt at the laboratory. The Method 29 train samples will be in acid solutions from the sample recovery, and additional acid will not be added for preservation.

Holding times will be monitored by keeping track of the time following sample collection. Samples will be delivered or shipped to the laboratory as necessary to meet the holding times for the sample analyses.

7.2 DOCUMENTATION

The following subsections present the requirements for labeling, maintaining the COC, and handling environmental samples. Recording information necessary for reconstruction of the sampling event will be discussed. Entries made on the following documents will use the error correction protocol of drawing one line through the error, then initialing and dating the change. Documentation will be made available to the DAQ and DSHW upon request.

7.2.1 Sample Labels

Sample labels are necessary to prevent misidentification of samples. Therefore, the samples collected by the sampling subcontractor will be labeled following a designated code system developed by the STC for this project. Samples will be sealed and the volume of the sample marked. The data from each sample run will be recorded on a run sheet during each performance run, and after each run, the data will be checked for completeness. The sampling subcontractor will then complete the appropriate COC forms to be sent to the laboratory.

TABLE A-7-1. SAMPLE PRESERVATION AND HOLDING TIMES

Parameter	Preservation	Holding Time
Process Streams (Residue)		
Metals	Cool ($\leq 4^{\circ}\text{C}$) pH ≈ 2 (Unpreserved)	6 months (28 days Hg) 28 days (14 days Hg)
VOCs	Cool ($\leq 4^{\circ}\text{C}$)	14 days
PCDDs/PCDFs	Cool ($\leq 4^{\circ}\text{C}$)	Extract 30 days. Analyze 45 days
Exhaust Gas		
Method 5 - PM	None Required	28 days
Method 26 - Sulfuric Acid Solutions	No Additional Required	28 days
Method 26 - Sodium Hydroxide Solutions	2 mL of 0.5 M $\text{Na}_2\text{S}_2\text{O}_3$	28 days
Method 29	No Additional Required	28 days
SMVOC Tubes and Condensate	Cool ($\leq 4^{\circ}\text{C}$)	14 days
Method 0023A	Cool ($\leq 4^{\circ}\text{C}$)	Extract 30 days. Analyze 45 days

Gummed-paper labels or tags will be used to identify the samples. The labels will include at least the following information:

- A sample number, including a sample code that distinguishes field samples, duplicates, or blanks where appropriate.
- A signature or the initials of the sample collector.
- The date and time of collection.
- The incinerator designator and trial run number.
- The type of preservative used, or "None," as applicable.

Labels will be affixed to sample containers prior to, or at the time of, sampling. However, the labels will be filled out at the time of sample collection.

7.2.2 Sample Seals

Sample seals are used to detect improper handling of samples from the time of sample collection through the time of analysis. Items such as gummed paper seals and custody tape will be used for this purpose. Signed and dated seals will be attached so that they must be broken to open either the individual sample containers or shipping containers. Seals will be affixed to containers before the samples leave the custody of the sampling personnel.

7.2.3 Chain-of-Custody Forms

The purpose of COC procedures is to document the identity of the sample and its handling, from collection through all transfers of custody. To establish the documentation necessary to trace sample possession from the time of collection, a COC record must be filled out and accompany every sample or group of individually identified samples.

A designated field technician will take custody, sign the COC forms, and deliver the samples to the laboratory. The field technician will sign the appropriate forms relinquishing custody, and the laboratory representative will sign the form indicating that they have taken custody of the samples. Examples of the sampling subcontractor's COC forms and other sampling documentation can be found in Annex B.

When a sample arrives at the laboratory, an individual with the COC authority who is trained in the laboratory sample receiving and control methods will take custody of the samples. The sample coolers will be opened by the sample custodian or designee and logged into the master sample log. A laboratory internal COC form will be completed, and the sample will be placed in locked storage. Laboratory analysts will sign out samples prior to analysis. The sample custodian will use a standard form to record the location of the sample and any transfers of the sample to analytical personnel. The laboratory sample custodian will keep the form until the project is complete. The forms will then be transferred to the Document Control Center with the project file.

The COC for the sampling trains will be established when the sampling crew take possession of the sample train components. Either the entire sampling crew handling the train or just one person may be listed on the train COC. The person recording the data will sign the COC for the sample when it reaches the sampling location. The person or persons transporting the sampling train to the sample recovery laboratory will sign the COC. When the sample train reaches the recovery laboratory, the laboratory chemist will check in the sample. The COC for the process samples will be filled out at the end of each performance run. Before that point, the samples will remain in the possession of the person collecting the samples. The samples may be secured in a cooler with the COC taped to the cooler until the performance run is completed. The samples will be secure because sample collection takes place in a high-security area. Personnel in the area must have a security clearance or be escorted by a security-cleared person before they are allowed within the double-fenced area. Only authorized personnel are allowed into the areas where the samples are held until shipment to the laboratory. Each person who has custody of the

samples fractions signs the COC when the fractions are all received. In addition, the chemist will then begin a new COC when the fractions have been correctly recovered, labeled, and sealed.

Each person who has custody of the samples must sign the COC form, which must contain the following information:

- The sample identification number;
- The date and time of sample collection;
- The signature or initials of the sample collector;
- The matrix type;
- The number of containers;
- The signatures of persons in the COC; and
- The date and time of each change in custody.

7.3 SAMPLE TRANSPORT TO THE LABORATORY

Samples will be packaged and shipped according to U.S. Department of Transportation and EPA regulations, and delivered to the laboratory so that the requested analyses can be performed within the specified allowable holding time. The samples will be accompanied by the COC record and a sample analyses request form. The request form will list the variables to be analyzed by the laboratory, and the total number and types of samples shipped for analysis. Authorized laboratory personnel will acknowledge receipt of shipment by signing and dating the COC form, and returning a copy to the Sampling Subcontractor QA Officer.

8.0 SPECIFIC CALIBRATION PROCEDURES AND FREQUENCY

This section contains information and details pertaining to the calibration of both the process monitoring systems and the exhaust gas sampling equipment.

8.1 PROCESS MONITORING EQUIPMENT CALIBRATION

Process control instruments are calibrated on a regular basis as directed in the Instrument Calibration Plan (8). The calibration status of the ATLIC process control instruments at the time of the ATLIC STB will be summarized in the final report. The calibrations will be conducted in accordance with the manufacturer's instructions. The monitoring equipment calibrated will be specified in the Appendix D tables [ATLIC Automatic Waste Feed Cutoff (AWFCO) tables]. These instruments include:

- The PCC temperature transmitters;
- The SCC temperature transmitters;
- The venturi differential pressure;
- The brine flow meter; and
- The pH meters.

Most of these instruments are on a regular schedule of calibration of every 180 to 360 days. The pH meters are on a weekly schedule for calibration. Temperature transmitters are calibrated every 90 days. The monitoring equipment calibrated is specified in the above mentioned tables in Appendix D.

8.2 EXHAUST GAS SAMPLING EQUIPMENT

The sampling subcontractor will calibrate the field sampling equipment before the ATLIC STB and verify the calibration afterwards. When the STC personnel arrive on site, they will provide copies of the calibration data to EG&G. The subcontractor will maintain an up-to-date list of sampling equipment, including serial numbers and pertinent calibration data. Posttest calibrations and equipment checks will be provided to EG&G before the subcontractor removes the equipment from the site. Calibration procedures will follow guidelines provided by EPA (9).

The calibrations and checks will be performed as directed below:

- *Probe Nozzles* - Using a micrometer, measure the inside diameter of the nozzle to the nearest 0.001 inch (0.025 mm). Make measurements at three separate places across the diameter, and obtain the average of the measurements. The maximum difference should not exceed 0.004 inch (0.1 mm). Inspect for damage after sampling.
- *Pitot Tubes* - Measure for appropriate spacing and dimensions or calibrate in a wind tunnel. The rejection criteria are provided on the calibration sheet. Inspect for damage after sampling.
- *Thermocouples* - Verify against a mercury-in-glass thermometer at three points, including the anticipated measurement range. Acceptance limits are: impingers, $\pm 2^{\circ}\text{F}$; dry gas meter, $\pm 5.4^{\circ}\text{F}$; and duct, ± 1.5 percent of the duct temperature.
- *Dry Gas Meters* - Calibrate in accordance with EPA Method 5 (6). Acceptance criteria: pre-test Y_c , ± 5 percent of the calculated average Y .
- *Balance* - Service and certify annually by the manufacturer. Prior to obtaining first weights, confirm accuracy by placing a known S-type weight on the balance. Balances will be used for weighing the impingers and samples before sending them to the laboratory.

8.3 CALIBRATION OF CONTINUOUS EMISSION MONITORING SYSTEMS

System checks will be performed on each of the CEMS analyzers (O_2 and CO) on a daily basis. Detailed information on the calibration of the CEMS is available in Attachment 20 of the TOCDF RCRA Permit (5). The CO CEMS are zero span checked daily as directed by Attachment 20 (5). The O_2 CEMS are zero span checked on a daily basis as directed by Attachment 20 (5). The CEMS operated by the sampling subcontractor will be calibrated before the ATLIC STB and checked on a daily basis. Criteria for the daily check of the sampling subcontractor CEMS are summarized in Table A-8-I.

TABLE A-8-1. SUMMARY OF CEMS PERFORMANCE CHECK REQUIREMENTS

Criteria	Oxygen ^a	Carbon Dioxide ^b	Total Hydrocarbon Content ^d
Calibration Drift (precision)	$\pm 0.5\%$ reference	$\pm 0.5\%$ reference	$\pm 3\%$ of span
Calibration Error (accuracy)	$\pm 0.5\%$ value	$\pm 0.5\%$ of span	$\pm 5\%$ of value
Response Time	≤ 2.0 min	≤ 2.0 min	≤ 2.0 min
Bias	$\pm 5\%$ of span	$\pm 5\%$ of span	NA
Interference	$\leq 2\%$ of span	$\leq 2\%$ of span	NA

NA = Not Applicable

^a 40 CFR 266, Appendix IX, Section 2.1.

^b 40 CFR 60, Appendix B, Performance Specification 3.

^c 40 CFR 60, Appendix B, Performance Specification 2.

^d 40 CFR 266, Appendix IX, Section 2.2.

9.0 ANALYTICAL OBJECTIVES AND PROCEDURES

This section describes the analytical procedures to be used to analyze the samples collected during the ATLIC STB. The analytical methods to be used include GC/MS, HRGC/HRMS, IC, Inductively Coupled Plasma/Mass Spectrometer (ICP/MS), and Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The QA procedures for this will follow the basic guidelines given in the methods or the QA/QC Handbook (4). Should a failure in the analytical system occur, the laboratory will notify EG&G immediately. Any corrective actions will be as directed by Annex A and EG&G. Table A-9-1 presents a summary of the analytical methods to be used.

The laboratories will prepare the sorbents (Tenax®, Anasorb®-747, and XAD-2®) for gas sampling, prepare the QC samples, and analyze the samples. Laboratory QC samples will include method blanks, blank spikes (as calibration checks and LCS), matrix spikes, and replicates. These will be performed as required by the methods or at least one round of samples per batch and one round every twenty samples. The field blank will be a sampling train assembled in the field, leak checked, let stand for the sample time, and then recovered as other trains. Table A-9-2 lists the expected number of field samples, field blanks, and trip blanks to be analyzed.

Table A-9-2 assumes the following for:

- Method 0031 (SMVOC) samples - Four sets of three tubes collected for 40 minutes, for a total of 160 minutes, plus a field blank set per run and a trip blank pair for each shipment of samples. Analyses will be for VOCs.
- Method 0023A samples - One set of samples per run, plus one field blank per STB. Analyses will be for PCDDs/PCDFs.
- Method 29 samples - One set of samples per run, plus one field blank per STB. Analyses will be for the HHRA metals.
- Method 5/26 samples - One set of samples per run, plus one field blank per STB. Analyses will be for PM, HCl, and Cl₂.
- Liquid Samples - The Brine samples will be collected during the final 60 minutes of the run. A spent decon sample will be collected for each run, but it may be collected before the run to allow analyses to be conducted before the run. One duplicate set of Brine and spent decon samples will be collected during one run. The liquid samples will be analyzed for total HHRA metals, VOCs, SVOCs, and PCDDs/PCDFs.

TABLE A-9-1. ANALYTICAL METHODS

Parameter	Matrix	Preparation	Analysis Method
VOCs	Tenax [®] , Anasorb [®] -747, SMVOC Condensate	Method 5041A	Method 5041A/8260B
PCDDs/PCDFs	XAD-2 [®] /filter/rinseate	Method 0023A	Method 0023A/8290
Particulate Matter (PM)	Filter/rinse	Method 5	Method 5
HCl and Cl ₂	Impinger solutions	Method 26	Method 9057
HIIIA Metals	Filter, rinse, impinger solution	Method 29	Methods 6020A and 7470A
Chlorobenzene and Tetrachloroethene	Surrogate Mixture	Method 3885	Method 8260B
HIIIA Metals	Surrogate Mixture	Method 3050A	Method 6020A/7470A
VOCs	Brine and spent decon	Method 5030B	Method 8260B
SVOCs	Brine and spent decon	Method 3510C	Method 8270D
PCDDs/PCDFs	Brine and spent decon	Method 8290	Method 8290
HIIIA Metals	Brine and spent decon	Method 3010A/3015A/7470A	Method 6010B/6020/7470A

TABLE A-9-2. NUMBER OF SAMPLES*

Sample	ATLIC STB	Field Duplicate	Field Blank	Trip Blank
Method 0031	12	0	3	3
Method 0023A	3	0	1	0
Method 5/26	3	0	1	0
Method 29	3	0	1	0
<i>Wet Scrubber Recirculation Brine</i>	3	1	0	0
Spent Decon	3	1	0	0
Surrogate Mixture	3	1	0	0

*Method blanks, blank spikes, matrix spikes, and replicates will be performed according to the methods.

9.1 ANALYSIS METHODS FOR PROCESS STREAM SAMPLES

Process samples collected include surrogate mixture, Brine, and spent decon. The process streams will be sampled each run.

9.1.1 pH Analysis

The pH of Brine samples and spent decon samples will be determined with a pH probe and pH meter using Tooele Laboratory Operating Procedure 574 (TE-LOP-574). The pH probe and meter are calibrated using appropriate standards; then the pH probe is rinsed, dried, and placed in the solution to be analyzed. The pH reading is recorded, and the probe is removed from the solution, rinsed with distilled or DI water, and dried. The probe is then ready for the next measurement.

9.1.2 Inorganic Analysis Methods

The process samples inorganic analyses are limited to the metals present in the samples. Mercury will be analyzed by SW-846, Methods 7470A (1), which uses CVAAS. The remaining HHRA metals are analyzed by ICP/MS. The methods are described below.

- SW-846 Method 7470A (liquids) - Manual Cold-Vapor Atomic Absorption Technique. A representative portion of the sample is digested with acids, potassium permanganate, and potassium persulfate. Mercury ions are reduced to metallic mercury and stripped from the aqueous solution with a gas stream. The mercury vapors are then directed into the path of an atomic absorption spectrometer. Quantitation is achieved by comparison of sample component responses to the responses of external standards.
- SW-846 Method 6020A - ICP/MS. The metals concentrations in the process samples will be determined by ICP/MS (the most recent version of the method). A representative portion of the sample is digested with nitric acid and the sample digest is aspirated into the nebulizer of the ICP/MS. The sample mist enters the plasma, the plasma converts the sample to an atomic vapor, and the mass spectrometer separates the elements by mass. The masses detected are used to quantitate the elements present by comparing sample responses to the responses of internal standards.

9.1.3 Organic Compound Analysis Methods

Brine and spent decon samples will be analyzed for VOCs (8260B), SVOCs (8270D), and PCDDs/PCDFs (8290A) using the most recent versions of the methods. These methods are described below, and their performance will be evaluated using the criteria listed in the QA/QC tables found in Annex A.

- SW-846 Method 8260B - Volatile Organic Compounds by GC/MS. A representative portion of the liquid samples is introduced into a purge device using SW-846, Method 5030B (1). The liquid is purged with an inert gas, and the volatile compounds are collected on a sorbent trap. The trap is then heated and backflushed to desorb the compounds into the GC/MS. The sample is then analyzed for the Target Analyte List shown in Table A-9-3 using SW-846, Method 8260B (1). Quantitation is achieved by comparison of sample component responses to the responses of internal standards.
- SW-846 Method 8270D - Semi-Volatile Organic Compounds by GC/MS. Aqueous samples have a representative aliquot of the sample extracted by SW-846, Method 3510B (1), using methylene chloride and then concentrated to a known volume. Aliquots of the extracts are analyzed by SW-846, Method 8270D (1), using GC/MS. Quantitation is achieved by comparison of sample component responses to the responses of internal standards. Table A-9-4 lists the target analytes for the total SVOC analyses.
- SW-846 Method 8290A - PCDDs/PCDFs by HRGC/HRMS. A representative sample is extracted with toluene; the extract is then concentrated to a known volume, and the extract is subjected to a series of cleanup steps. The sample is evaporated to a small volume and diluted to a known volume. An aliquot of the cleaned extract is then injected into an HRGC/HRMS and the compounds quantitated against internal standards as directed by SW-846, Method 8290A.

TABLE A-9-3. TOTAL VOC TARGET ANALYTE LIST FOR PROCESS SAMPLES

1	Acetone	29	1,2-Dichloropropane
2	Benzene	30	1,3-Dichloropropane
3	Bromobenzene	31	2,2-Dichloropropane
4	Bromochloromethane	32	1,1-Dichloropropene
5	Bromodichloromethane	33	<i>cis</i> -1,3-Dichloropropylene
6	Bromomethane	34	<i>trans</i> -1,3-Dichloropropylene
7	2-Butanone	35	1,4-Dioxane
8	Carbon Disulfide	36	Ethylbenzene
9	Carbon tetrachloride	37	n-Hexane
10	Chlorobenzene	38	2-Hexanone
11	2-Chloro-1,3-butadiene	39	Iodomethane
12	Chlorodibromomethane	40	Methylene chloride
13	Chloroethane	41	Methyl isobutyl ketone
14	Chloroform	42	n-Propylbenzene
15	2-Chloroethyl vinyl ether	43	Styrene
16	Chloromethane	44	1,1,1,2-Tetrachloroethane
17	2-Chlorotoluene	45	1,1,2,2-Tetrachloroethane
18	4-Chlorotoluene	46	Tetrachloroethylene
19	Cumene (isopropylbenzene)	47	Toluene
20	1,2-Dibromoethane	48	Tribromomethane (Bromoform)
21	Dibromomethane	49	1,1,1-Trichloroethane
22	<i>trans</i> -1,4-Dichloro-2-butene	50	1,1,2-Trichloroethane
23	Dichlorodifluoromethane	51	Trichloroethylene
24	1,1-Dichloroethane	52	Trichlorofluoromethane
25	1,2-Dichloroethane	53	1,2,3-Trichloropropane
26	1,1-Dichloroethylene	54	1,1,2-Trichloro-1,2,2-trifluoroethane
27	<i>cis</i> -1,2-Dichloroethylene	55	Vinyl chloride
28	<i>trans</i> -1,2-Dichloroethylene	56	Xylenes(o-, m-, p-)

**TABLE A-9-4. TOTAL SVOC TARGET ANALYTE LIST
FOR PROCESS SAMPLES**

1	Acenaphthylene	35	1,4-Dinitrobenzene
2	Acenaphthene	36	4,6-Dinitro-o-cresol
3	Acetophenone	37	2,4-Dinitrophenol
4	Aniline	38	2,4-Dinitrotoluene
5	Anthracene	39	2,6-Dinitrotoluene
6	Benz(a)anthracene	40	Di-n-octyl phthalate
7	Benzo(b)fluoranthene	41	Diphenylamine
8	Benzo(k)fluoranthene	42	Fluoranthene
9	Benzo(g,h,i)perylene	43	Fluorene
10	Benzo(a)pyrene	44	Hexachlorobenzene
11	4-Bromophenyl phenyl ether	45	Hexachlorobutadiene
12	Butyl benzyl phthalate	46	Hexachlorocyclopentadiene
13	p-Chloroaniline	47	Hexachloroethane
14	Chlorobenzilate	48	Indeno(1,2,3-c,d) pyrene
15	Bis (2-Chloroethoxy)methane	49	Naphthalene
16	Bis (2-Chloroethyl)ether	50	2-Naphthylamine
17	Bis (2-Chloroisopropyl) ether	51	2-Nitroaniline
18	4-Chloro-3-methylphenol	52	4-Nitroaniline
19	2-Chloronaphthalene	53	Nitrobenzene
20	2-Chlorophenol	54	2-Nitrophenol
21	Chrysene	55	4-Nitrophenol
22	o-Cresol	56	Pentachlorobenzene
23	m-Cresol	57	Pentachloroethane
24	p-Cresol	58	Pentachloronitrobenzene
25	Dibenz(a,h)anthracene	59	Pentachlorophenol
26	m-Dichlorobenzene	60	Phenanthrene
27	o-Dichlorobenzene	61	Phenol
28	p-Dichlorobenzene	62	Pyrene
29	2,4-Dichlorophenol	63	1,2,4,5-Tetrachlorobenzene
30	2,6-Dichlorophenol	64	2,3,4,6-Tetrachlorophenol
31	Diethyl phthalate	65	1,2,4-Trichlorobenzene
32	2,4-Dimethyl phenol	66	2,4,5-Trichlorophenol
33	Dimethyl phthalate	67	2,4,6-Trichlorophenol
34	Di-n-butyl phthalate		

9.1.4 Surrogate Mixture Characterization Methods

Surrogate mixture samples collected are evaluated for chlorobenzene, tetrachloroethene, and HHRA metals. The samples are prepared for chlorobenzene and tetrachloroethene analyses using SW-846, Method 3585. Sample aliquots are weighed and then diluted with n-hexadecane or other appropriate solvent to a known volume. The diluted samples are analyzed by direct injection of an appropriate aliquot into a GC/MS setup for analyses in accordance with SW-846, Method 8260B. The compounds present are quantitated against internal standards.

The HHRA metals present in the surrogate mixture samples are analyzed using SW-846, Methods 3051A/6020A/7470A. The surrogate mixture samples are prepared for analysis using Method 3551A by digesting an aliquot of the surrogate mixture in a combination of hydrochloric acid and nitric acid and heating in a microwave oven. The digested sample is then diluted to a known volume. The mercury analyses are conducted on the prepared samples by Method 7470A using CVAAS. The other HHRA metals are analyzed by Method 6020A. The prepared samples are aspirated into the plasma which produces an atomic vapor and the mass spectrometer separates the elements by their mass. The elements are quantitated against internal standards.

9.2 ANALYSIS METHODS FOR EXHAUST GAS SAMPLES

9.2.1 Analysis of SMVOC Tubes

The samples collected from each SMVOC set will consist of two Tenax® tubes and an Anasorb®-747 tube. The two Tenax® tubes will be desorbed as one sample, and each Anasorb®-747 tube will be analyzed as a separate sample. The tubes will be analyzed for VOC's by thermal desorption and subsequent analysis by GC/MS, using Method 5041A (1). The organic compounds in the sample will be thermally desorbed into water using a carrier gas. The desorbed compounds will then be purged from the water and collected on an analytical trap containing Tenax® and other GC-column packing materials. The compounds will be desorbed off the trap into the GC/MS.

Selected compounds are spiked into various parts of the Method 5041A analysis apparatus, and spiking locations are specified by Method 0031 (1). For Method 5041A, the following compounds are specified:

<u>Application</u>	<u>Compounds</u>	<u>Spiking Location</u>
Surrogates	Dibromofluoromethane, Bromofluorobenzene, 1,2-Dichloroethane-d ₄ , and Toluene-d ₈	Tenax® tube
Internal Standards	Bromochloromethane, Chlorobenzene-d ₅ , and 1,4- Difluorobenzene	Purge Vessel
LCS	1,1-Dichloroethene, Benzene, Chlorobenzene, Toluene, and Trichloroethene	Tenax® tube
MS/MSD for Condensate Samples	1,1-Dichloroethene, Benzene, Chlorobenzene, Toluene, and Trichloroethene	Purge Vessel

Sample breakthrough will be checked by analyzing the two Tenax® tubes separately from the Anasorb®-747 tube. Breakthrough will be defined as 30 percent or greater on the Anasorb®-747 tube relative to the two Tenax® tubes. This criterion will not apply if 75 ng or less is detected on the Anasorb®-747 tube. The analysis results of the two Tenax® tubes and the Anasorb®-747 tube will be summed for subsequent emission calculations.

The VOCs determined by Method 5041A (1) will be identified as Products of Incomplete Combustion with the exception of chlorobenzene and tetrachloroethene. Table A-9-5 is the Target Analyte List for the VOCs. The method for analysis of the Tenax® tubes is calibrated with standards for the 56 compounds listed in Table A-9-5. The method of analysis for the Anasorb®-747 tubes is calibrated for the 31 compounds marked in Table A-9-5.

The compounds not analyzed on the Anasorb®-747 tubes are not quantitatively desorbed from the Anasorb®-747 tubes. These compounds will be collected on the Tenax® tubes. The final VOC concentrations will be a summation of the analyses from the Tenax® tube pairs, the Anasorb®-747 tubes, and the condensate sample. The 20 largest additional peaks, with an area at least 10 percent of the internal standards, will be tentatively identified from each analyses conducted and will be classified as Tentatively Identified Compounds (TICs). Performance of this method will be evaluated using the criteria listed in the QA/QC tables found in Annex A.

**TABLE A-9-5. VOLATILE ORGANIC COMPOUND TARGET ANALYTE
LIST FOR METHOD 5041A**

Acetone	<i>trans</i> -1,2-Dichloroethene *
Benzene *	1,2-Dichloropropane *
Bromobenzene	1,3-Dichloropropane
Bromochloromethane *	2,2-Dichloropropane
Bromodichloromethane *	1,1-Dichloropropene *
Bromoform	<i>cis</i> -1,3-Dichloropropene *
Bromomethane *	<i>trans</i> -1,3-Dichloropropene *
2-Butanone	Ethylbenzene
Carbon disulfide *	n-Hexane
Carbon tetrachloride *	2-Hexanone
Chlorobenzene *	Iodomethane
Chloroethane *	Methylene chloride *
Chloroform *	4-Methyl-2-pentanone
Chloromethane *	n-Propylbenzene
2-Chloropropane *	Styrene
2-Chlorotoluene	1,1,1,2-Tetrachloroethane
4-Chlorotoluene	1,1,2,2-Tetrachloroethane
Cumene	Tetrachloroethene *
Dibromochloromethane	Toluene *
1,2-Dibromoethane	1,1,1-Trichloroethane *
Dibromomethane *	1,1,2-Trichloroethane *
<i>cis</i> -1,4-Dichloro-2-butene	Trichloroethene *
<i>trans</i> -1,4-Dichloro-2-butene	Trichlorofluoromethane *
Dichlorodifluoromethane *	1,2,3-Trichloropropane
1,1-Dichloroethane *	1,1,2-Trichloro-1,2,2-trifluoroethane *
1,2-Dichloroethane *	Vinyl chloride *
1,1-Dichloroethene *	m,p-Xylene
<i>cis</i> -1,2-Dichloroethene *	o-Xylene

* These compounds will be analyzed on the Amersorb®-747 tubes.

9.2.2 Analysis of Method 0023A Samples for PCDDs/PCDFs

The filter, XAD-2® resin, and the impinger rinses will be extracted with toluene and evaporated to a known volume. Then, the extract will be subjected to a series of cleanup procedures to remove interferences. The final extract will be analyzed for PCDDs/PCDFs using Methods 0023A/8290 (1). An aliquot of the cleaned extract is injected into an HRGC/HRMS, and quantitation is achieved by comparison to internal standards.

The Method 0023A train is recovered into four containers that are subsequently combined into two fractions. Surrogates are spiked onto the XAD-2® resin before the samples are collected for the back-half fraction. Surrogates for the front-half fraction are spiked onto the filter just before the filter is placed in the extraction thimble. The front-half fraction internal standards are spiked onto the filter after it has been placed in the extraction thimble. The back-half fraction internal standards are spiked onto the XAD-2® resin after the resin has been transferred to the extraction device. Method 0023A/8290 (1) specifies the following standards:

STANDARD	COMPOUNDS
Surrogate Standards	²⁷ Cl ₄ -2,3,7,8-TCDD, ¹³ C ₁₂ -1,2,3,4,7,8-HxCDD, ¹³ C ₁₂ -2,3,4,7,8-PeCDF, ¹³ C ₁₂ -1,2,3,4,7,8-HxCDF, ¹³ C ₁₂ -1,2,3,4,7,8,9-HpCDF
Internal Standards	¹³ C ₁₂ -2,3,7,8-TCDD, ¹³ C ₁₂ -1,2,3,7,8-PeCDD, ¹³ C ₁₂ -1,2,3,6,7,8-HxCDD, ¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDD, ¹³ C ₁₂ -OCDD, ¹³ C ₁₂ -2,3,7,8-TCDF, ¹³ C ₁₂ -1,2,3,7,8-PeCDF, ¹³ C ₁₂ -1,2,3,6,7,8-HxCDF, ¹³ C ₁₂ -1,2,3,4,6,7,8-HpCDF

Table A-9-6 shows the target analyte list for this method. Performance of the method will be evaluated using the criteria listed in the Q/VQC tables found in Annex A.

TABLE A-9-6. PCDD/PCDF TARGET ANALYTE LIST

Polychlorinated Dibenzo-P-Dioxins	Polychlorinated Dibenzofurans
2,3,7,8-TCDD	2,3,7,8-TCDF
Total TCDDs	Total TCDFs
1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDF
Total PeCDDs	2,3,4,7,8-PeCDF
1,2,3,4,7,8-HxCDD	Total PeCDFs
1,2,3,6,7,8-HxCDD	1,2,3,4,7,8-HxCDF
1,2,3,7,8,9-HxCDD	1,2,3,6,7,8-HxCDF
Total HxCDDs	2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-HpCDD	1,2,3,7,8,9-HxCDF
Total HpCDDs	Total HxCDFs
Octachlorodibenzo-p-dioxin	1,2,3,4,6,7,8-HpCDF
	1,2,3,4,7,8,9-HpCDF
	Total HpCDFs
	Octachlorodibenzofuran

9.2.3 Analysis of Metals Emissions

The Method 29 samples will be analyzed for the HHRA metals and are listed in Table A-9-7. The samples will be prepared as described in Method 29 (6). Mercury will be analyzed by CVAAS using Method 7470A. The remaining elements will be analyzed by ICP/MS using SW-846, Method 6020 (1), which was modified by adding tin and vanadium to the analyte list.

- SW-846 Method 7470A (liquids) - Manual Cold-Vapor Atomic Absorption Technique. A representative portion of the sample is digested with acids, potassium permanganate, and potassium persulfate. Mercury ions are reduced to metallic mercury and stripped from the aqueous solution with a gas stream. The mercury vapors are then directed into the path of an atomic absorption spectrometer. Quantitation is achieved by comparison of sample component responses to the responses of external standards.
- SW-846 Method 6020 – ICP/MS. Metals concentrations in the Method 29 samples will be determined by ICP/MS (the most recent version of the method). A representative portion of the sample is digested with nitric acid and the sample digest is aspirated into the nebulizer of the ICP/MS. The sample mist enters the plasma, the plasma converts the sample to an atomic vapor, and the mass spectrometer separates the elements by mass. The masses detected are used to quantitate the elements present. Quantitation is achieved by comparison of sample responses to the responses of internal standards.

Performance of the method will be evaluated using the criteria listed in the QA/QC tables found in Annex A.

9.2.4 Analysis of Halogen Emissions

The analysis of HCl and Cl₂ in the exhaust gas impinger samples will be performed by IC using Method 9057 (1). This method separates the anions by ion chromatography and the eluting anions are detected. The HCl emissions are determined from the analysis of the sulfuric acid impingers, and Cl₂ emissions are determined from the analysis of the NaOH impingers using IC. Concentrations are calculated based on external calibration standards. Performance of the method will be evaluated using the criteria listed in the QA/QC tables found in Annex A.

9.2.5 Particulate Matter Analysis

The probe rinse and the filter of the combined Method 5/26 (6) train will be used to determine the PM concentrations. The probe rinse and filter will be dried and desiccated to a constant weight as directed in Method 5 (6).

TABLE A-9-7. METHOD 29 TARGET ANALYTE LIST

Analyte	Analyte
Aluminum	Lead
Antimony	Manganese
Arsenic	Mercury
Barium	Nickel
Beryllium	Selenium
Boron	Silver
Cadmium	Thallium
Chromium	Tin
Cobalt	Vanadium
Copper	Zinc

10.0 SPECIFIC LABORATORY QUALITY CONTROL CHECKS

The QC checks are performed to ensure the collection of representative samples and the generation of valid analytical results on these samples. The project participants will perform QC checks throughout the program. The laboratories will utilize EPA-approved analytical methods for those analytes that have methods available. The QC samples analyzed will include method blanks, duplicate samples, LCS, and MS/MSD. Table A-9-2 lists the field blanks to be collected.

Reagents used in the laboratory are normally of analytical reagent grade, or higher, purity; each lot of acid or solvent used is checked for acceptability prior to laboratory use. All reagents are labeled with the date received and the date opened. The quality of the laboratory DI water is routinely checked. The glassware used in the sampling and analysis procedures are pre-cleaned according to the method requirements. Standard laboratory practices for laboratory cleanliness, personnel training, and other general requirements will be used, and the results of these QC procedures will be included in the final report.

10.1 METHOD BLANKS

Method blanks contain all the reagents used in the preparation and analysis of samples and are processed through the entire analytical scheme to assess any spurious contamination that might arise from reagents, glassware, and other sources. The QC criteria for method blanks are shown in Annex A by individual method.

10.2 LABORATORY CONTROL SAMPLES

The LCSs are samples generated from analyte spikes into a neutral matrix prepared independently from the calibration concentrates. The LCS is used to establish that an instrument or procedure is in control. An LCS is normally carried through the entire sample preparation and analysis procedure. The QC criteria for the LCSs are listed in Annex A by analysis method.

10.3 DUPLICATE ANALYSES

Duplicate sample analysis will be used to evaluate the variance in a particular applied analytical method. Field duplicate samples will be collected for the surrogate mixture, Brine, and spent decon samples during one performance run. Samples analyzed by CVAAS will be analyzed in duplicate as specified in the method. Duplicate analyses will be performed on the halogen samples analyzed by IC. One of the metals emission samples will also be analyzed in duplicate as a measure of the precision of the analysis method.

10.4 MATRIX SPIKE SAMPLES

Matrix spikes are samples spiked with the analyte of interest and then analyzed to determine a %R. It is anticipated that these analyses would assess the behavior of actual analyses in individual program samples during the entire preparative and analysis scheme. Matrix spike analysis will be conducted to evaluate accuracy and general matrix recovery. An MS/MSD will be prepared from the process water, Brine, and spent decon samples. The QC criteria for %R and RPD are shown in Annex A for each method.

10.5 SURROGATE SPIKES

Surrogate spikes will be used for GC/MS analysis methods as an indicator of the general accuracy of sample preparation and analysis. The QC criteria for surrogate spike recoveries are listed in Annex A by analysis method. The following surrogate compounds will be used for VOC analyses: toluene- d_8 , bromofluorobenzene, and 1,2-dichloroethane- d_4 . The following surrogate compounds will be used for analysis of SVOCs: nitrobenzene- d_5 , fluorobiphenyl, terphenyl- d_{11} , phenol- d_5 , 2-fluorophenol, and 2,4,6-tribromophenol. Surrogate spikes will also be used for Method 8290 for PCDD/PCDF analyses.

10.6 ANALYTICAL INSTRUMENT CALIBRATION

The analytical instrumentation used in the laboratory for analysis of ATLIC SIB samples will undergo several performance checks. An initial calibration curve will be analyzed before performing any samples analyses to compare linearity of response to concentration of known amounts of the analytes of interest. The initial calibration for some methods will use a calculated Correlation Coefficient (CC) to demonstrate acceptability of the calibration. On a daily basis, a continuing calibration check will be analyzed before any samples are run for that day. If acceptance criteria (as specified in the appropriate analytical methods for initial or continuing calibrations) are not met, sample analysis will not proceed until the analytical problem has been rectified and the criteria have been met. Linearity checks will be used to verify that response has not shifted significantly from the most recent calibration. Some methods will use an Initial Calibration Verification (ICV) to demonstrate that the calibration was accurate, and Continuing Calibration Verification (CCV) will be used to ensure that the calibration is still representative. A summary of the calibration procedures and frequency for the laboratory instruments to be used for this project is provided in Table A-10-1. The instrument initial calibration procedures and acceptance criteria will be those established in the analytical method and listed in Annex A. Internal standards will be analyzed to evaluate instrument and method performance. The QC criteria for the internal standards are listed in Annex A by analysis method.

TABLE A-10-1. CALIBRATION PROCEDURES FOR ANALYTICAL METHODS

Method	Analytical Equipment	Calibration Curve	Calibration Checks	Target Criteria
7470A	CVAAS	Calibration blank and 5 standards to give CC = 0.995	CCV every 10 samples and at the end of the run sequence	CCV \pm 10 % of known value
6020A	ICP/MS	Calibration blank and one standard	CCV every 10 samples and at the end of the run sequence	CCV \pm 10 % of known value
5041A/8260B	GC/MS	Five-point calibration	CCC** every 12-hour tune period	Drift \leq 20 %
8270D	GC/MS	Five-point calibration	Verified every 12-hour tune period	Variability of average RRF of 30% RSD
8290	HRGC/HRMS	Five-point calibration	Verified every 12-hour tune period	Variability of average RRF of 30 % RSD
Method 5	Analytical Balance	NIST traceable weights	Beginning and end of day	Self-taring
9057	Ion Chromatograph	Four-point calibration giving a CC = 0.995	CCV every 10 samples and at the end of the sequence	CCV \pm 10 % of known value

CCC = Calibration Check Compound

RRF = Relative Response Factor

NIST = National Institute for Standards and Technology

11.0 DATA REPORTING, DATA REVIEW, AND DATA REDUCTION

Reporting the data generated during an STB is an important part of the overall project. This section describes and discusses the components of reporting, reviewing, and reducing the collected STB data.

11.1 DATA REPORTING

The data reporting process will discuss the analytical data packages, the data generated for this STB, and the final ATLIC STB Report.

11.1.1 Analytical Data Packages

Data reported from commercial laboratories is required to be similar to the format used by the EPA Contract Laboratory Program (CLP). This format includes a case narrative section, Analytical Data Summary Sheets, QC Sample Results, the COC forms, and raw data organized by analytical method. Complete data packages are included so that an independent verification of the final analytical results can be conducted. These data packages are stand-alone deliverables that include the instrument raw data, parameter-specific QC documentation, calibration and calibration check performance, and instrumentation performance information.

The case narrative will:

- Describe the data package and identify project-specific information.
- *Discuss any pertinent information concerning data quality and any difficulties or analytical anomalies encountered in the analyses.*
- Provide a cross-reference listing of the field sample and laboratory sample identities.
- Discuss information on achieving DQOs or project-specific objectives.

The Analytical Data Summary Sheets will contain a summary of the analytical results and the key QC data. A separate sheet will be provided with the results for each sample. These data will include the results, recovery of any surrogate materials, date sampled, and analysis date, which will allow confirmation of meeting the QC and holding time requirements. Summary sheets for the analysis of the QC samples will follow the sample results sheets.

Copies of the COC forms are also a part of the data package. These copies are submitted with the samples and copies of any internal COC forms used to track the samples through the different analyses in the laboratory.

Raw data will be included in the Analytical Data Packages. This raw data will include chromatograms for those methods generating them, blank data, sample preparation sheets, copies of sequence files, and calibration data. The raw data will be organized by analysis method, and enough data will be supplied to allow recreation of the sample analysis event.

11.1.2 Analytical Data Format

The data that will be reported as "not detected" will use the LOQ for the lower reporting limit. Analytes detected with a concentration between the MDL and the LOQ will be qualified as an estimate and reported. The LOQ is the same as the reporting limit used by some laboratories. The LOQ will be defined as the quantitation level that corresponds to the lowest level at which the entire analytical system gives reliable signals and an acceptable calibration point or low-level matrix spike. Each compound or element is assigned an LOQ that is contingent upon the behavior of the compound or element during analysis. Changes to extraction protocol, amount of sample prepared, or dilution applied to the sample can raise or lower the LOQ.

The analytical results for PCDDs/PCDFs are quantitated differently. They are quantitated using an isotope dilution method. Each sample is spiked with an isotopically-labeled surrogate for each target compound. On a sample-by-sample basis, the recovery of each surrogate is determined; then, the analytical result is normalized to the recovery of the corresponding surrogate compound. In this manner, the LOQ for each sample and each compound can vary as the surrogate recovery varies. This isotope dilution method is considered to be the most accurate quantitation method available for these analyses.

Sample analysis results will be reported by the laboratory in matrix-specific units. Results will be reported for all samples and parameters required for this STB, as listed in Table A-9-1. The laboratory will assign qualifiers to the results, when necessary, based on guidelines found in the analytical method, CIP, or in this QAPP. Qualifiers appearing on the analytical summary sheets are defined on that specific sheet. Data presented in tables in the ATLIC STB Report will note any data qualifiers.

11.1.3 ATLIC STB Report

An ATLIC STB Report will be prepared and submitted to the DAQ and DSHW. EG&G will complete the STB report as outlined in Section 8.0 of the STB plan. The report will compare the STB results to the RCRA Permit, Title V Permit, and MACT limits.

The ATLIC STB Report will also contain:

- *Daily run summaries.*
- A summary of incinerator operating parameter data and associated limits.

- A summary of sampling and analytical methods used and any deviations from referenced methods.
- Analysis results, protocols, and quantitative gas analyses.
- CEMS data emission averages and calculations.
- A compilation and evaluation of analytical calibration data and QA/QC data, and identification of problems encountered and the solutions implemented.
- Copies of calibration data, chromatograms, and other raw data.
- Audit cylinder results calculated in parts per billion (ppb).
- Examples of all calculations, sampling train data, concentrations, and emission rates for all gases and particulate samples collected.

A QA/QC Report will be submitted to the EG&G CAR and included in the ATLIC STB Report as an appendix. Additionally, each formal data deliverable will contain a summary of QA/QC activities. This summary will include:

- Estimates of precision, accuracy, and completeness of reported data.
- Reports of performance and system audits.
- Any quality problems found.
- Any corrective actions taken.

11.2 DATA REVIEW

The STC will review the field sampling data to determine the representativeness of the samples; maintenance and cleanliness of sampling equipment; and the adherence to the approved, written sample collection procedure. All field data will be recorded on prepared forms, and the data sheets will be reviewed at the end of each run by the STC and the Sampling Subcontractor QA Officer to ensure that each sheet is properly completed. The gas sampling data will be reduced on-site to verify isokinetic sampling rates. Furthermore, the sampling subcontractor's software for determining sample volumes and isokinetic sampling rates will be checked for accuracy against an independent program, and any differences resolved before inclusion in the final report.

The analyst generating the data will review the laboratory data; then, the analyst's supervisor will review the data. The laboratory QC personnel will further review the data per the laboratory

procedure before the project report is prepared by the Subcontractor Laboratory Project Manager. When the analytical data are submitted to the sampling subcontractor, the data will again be reviewed before it is used to prepare the ATLIC STB Report. This review process will confirm that the data are usable for an assessment of incinerator performance.

11.2.1 Data Validation

Data validation is the process of accepting or rejecting data on the basis of established criteria. Analytical and sampling data will be validated by the STB subcontractor QC personnel using criteria outlined in this QAPP. The subcontractor QC personnel will use validation methods and criteria appropriate to the type of data, even data judged to be "outlying" or of spurious value. The persons validating the data will have sufficient knowledge (i.e., at least one year of experience in data validation) of the sampling and analytical methods to identify questionable values and deviations from criteria specified in the methods and the QAPP.

The results from the field and laboratory method blanks, replicate samples, and internal QC samples will be used to further validate analytical results. Analytical results on the field blanks and replicate samples also are valuable for validation of sample collection. The QA/QC personnel will review all laboratory and sampling raw data to verify: calculated results presented, consistency, duplicate sample analysis, spike recoveries, tests for outliers, and transmittal errors.

The criteria that will be used to evaluate the field sampling data include:

- Use of approved test procedures.
- Proper operation of the process being tested.
- Use of properly operating and calibrated equipment.
- Use of proper forms for recording data, including identification numbers for each nozzle, probe, and dry gas meter.
- Leak checks conducted before tests, during port changes, and after tests.
- Use of reagents that conform to QC-specified criteria.
- Maintenance of proper traceability.

The criteria used to evaluate analytical data include:

- Use of approved analytical procedures.
- Use of properly operating and calibrated instrumentation.

- Precision and accuracy comparable to that achieved in previous analytical programs and consistent with the DQOs listed in Annex A.

See Section 10.0 for the anticipated minimum number of QC samples. The %R of each matrix will be calculated as shown in Section 13.0. Inorganic data will be evaluated using the general methods outlined in the EPA CLP guidelines for inorganic data (10) using the criteria from Annex A. The organic data will be evaluated using the general methods outline in the EPA CLP guidelines for low level organic data (11). The PCDD/PCDF data will be evaluated using the general methods outlined in the EPA guidelines for dioxin data (12). These evaluations will be included in the QA report, which will be an appendix to the final report.

11.2.2 Identification and Treatment of Outliers

Any point that deviates from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data while it is under investigation. One or both of the following tests will be used to identify outliers:

- Dixon's test for extreme observations, which is a computed procedure for determining whether a single, very large or very small value is consistent with the data set.
- The one-tailed t-test for difference.

If more than one outlier is suspected in the same data set, other statistical sources will be consulted, and the most appropriate test of the hypothesis will be used and documented.

Those persons involved in the analysis and data reduction will be consulted if a data outlier is suspected, as they may be able to add some insight to the evaluation of the suspect data. This evaluation may provide an experimental basis for the outlier to determine its affect on the conclusions. Two data sets may be reported – one including and one excluding the outlier.

11.3 DATA REDUCTION

Specific QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information, followed by clear and concise reporting of the data, is a primary goal in all projects.

11.3.1 Field Data Reduction

Annex B contains the standardized data sheets that are representative of those used to record gas sampling data. Raw sampling data will be reduced on a daily basis and will be reviewed in the field by the STC and the sampling team leader. Isokinetic sampling rates and sample volumes

will be reported daily. Any errors or discrepancies will be noted in a field notebook. The sampling team leader has the authority to institute corrective actions in the field, and the STC will also be consulted for resolution if the situation warrants. At a minimum, the Sampling Subcontractor QA Officer and the EG&G CAR will be apprised of all deviations from the standard protocol.

11.3.2 Laboratory Analysis Data Reduction

Analytical results will be reduced to concentration units specified by the analytical procedure and using the equations given in the analytical procedures. Results will be reported on an as received basis. If the units are not specified, then units for data will be used as follows:

- Liquid samples will be reported in milligrams per liter (mg/L).
- Surrogate mixture sample results will be reported in weight percent (Wt%) for the organic compounds and milligrams per kilogram (mg/kg) for the metals results.
- Gas samples will be reported on a mass per dry standard cubic unit of measure except for the halogen emissions and results from the CFMS, which are reported in parts per million (ppm).
- Oxygen and carbon dioxide data will be reported in volume percent.
- Audit cylinder analysis results will be reported in parts per billion (ppb).

11.3.3 Blank Corrected Data

Results from the metals emissions train will be blank corrected as instructed in Method 29 (6). A separate blank correction will be made for the front half and the back half. The raw data will also be reported. The other data developed for this STB will not be blank corrected.

11.4 EXHAUST GAS SAMPLE TRAIN TOTAL CALCULATIONS

The calculation of the train total of an analyte is the sum of two or more fractions of train components. Analytes not detected in the analysis will be reported as < LOQ. Analytes with concentrations between the MDL and the LOQ will be qualified as estimated and reported. The summation for the total will use the LOQ value for those analytes not detected and the reported values for those analytes detected, including values between the MDL and LOQ. Totals including LOQ and qualified data will have a "<" flag added to the reported total. When the analyte is not detected in any of the fractions, the LOQ value for each fraction will be summed for the total, and the results flagged with an "ND" to indicate the analyte was not detected.

Calculations will be carried out to at least one decimal place beyond that of the acquired data and should be rounded, after final calculations, to three significant figures for each analyte for a train total. Rounding of numbers should conform to procedures found in ASTM SI-10 (13).

11.4.1 Calculation of Chlorobenzene Emissions and DRE

Chlorobenzene is a HAP that was chosen to be the surrogate for organic compounds fed to the PCC because it is a Class 1 compound in the EPA's thermal stability ranking system. Chlorobenzene is also a VOC that is identified in the emissions of incinerators. The calculations of the chlorobenzene emissions are shown here as an example calculation for VOC emissions. The chlorobenzene emissions are calculated from the example data shown in Table A-11-1.

TABLE A-11-1. CHLOROBENZENE EMISSIONS CALCULATION DATA

Sample Identification	Tenax® Tubes (ng)	Anasorb®-747 Tube (ng)	Sample Volume (dsL)*
Sample 1a	24	<10	19.7
Sample 1b	32	<10	19.9
Sample 1c	28	<10	19.8
Sample 1d	30	<10	19.7
Condensate (ng total)	< 80		
Train Total (ng)	< 234		79.1

*dsL = dry standard liter

The chlorobenzene concentration is calculated from the Train Total of chlorobenzene collected and the Sample Volume using the equation:

$$\text{Conc., } \mu\text{g/dscm} = (< 234 \text{ ng}/79.1 \text{ dsl}) \times (1 \mu\text{g}/1000 \text{ ng}) \times (1000 \text{ dsl/dscm}) = < 2.96 \mu\text{g/dscm}$$

The chlorobenzene ER is calculated from the chlorobenzene concentration and the exhaust gas flow rate using the equation:

$$\text{ER} = \text{Conc., } \mu\text{g/dscm} \times \text{Exhaust Gas Flow Rate}$$

$$\begin{aligned} \text{ER, g/sec} &= (< 2.96 \mu\text{g/dscm} \times 934 \text{ dscf/min}) \times (1 \text{ min}/60 \text{ sec}) \times (1 \text{ dscm}/35.3147 \text{ dscf}) \times \\ &\quad (1 \text{ g}/10^6 \mu\text{g}) \\ &= < 1.305 \times 10^{-6} \text{ g/sec} \end{aligned}$$

$$\text{ER, lb/hr} = (< 1.305 \times 10^{-6} \text{ g/sec}) \times (3600 \text{ sec/hr}) \times (\text{lb}/453.59 \text{ g}) = < 1.03 \times 10^{-3} \text{ lb/hr}$$

Where: Exhaust Gas Flow Rate = 934 dscf/min

Determine DRE:

$$\frac{(160 \text{ lb/hr} - 1.03 \times 10^{-5} \text{ lb/hr})}{160 \text{ lb/hr}} \times 100\% = 99.9999936\%$$

12.0 ROUTINE MAINTENANCE PROCEDURES AND SCHEDULES

The sampling subcontractor will follow an orderly program of positive action to prevent the failure of equipment or instruments during use. This preventative maintenance and careful calibration helps to ensure accurate measurements from field and laboratory instruments.

All equipment that is scheduled for field use will be cleaned and checked prior to calibration. Once the equipment has been calibrated, sample trains are assembled and leak checked to reduce problems in the field. An adequate supply of spare parts will be available in the field to minimize any downtime caused by equipment failure.

The TOCDF CEMS are operated and maintained in accordance with Attachment 20 to the TOCDF RCRA Permit (5). Maintenance is performed on a regularly scheduled basis prior to use in the field and includes, but is not limited to, purging of sample lines, checking pump oil and belts, cleaning rotometers or other sample flow monitoring devices, and checking sample capillaries and mirrors. Routine maintenance procedures are critical for ensuring the continuous, trouble-free operation of the CEMS in adverse environments.

The sampling subcontractor will maintain their CLMS in accordance with the specific methods and manufacturer specifications. Sample lines will be inspected daily to ensure no leaks or other problems occur. The subcontractor laboratories will maintain their instrumentation in accordance with the instrument manufacturer specifications and appropriate methods. In addition, the laboratories will maintain a stock of replacement parts to minimize downtime resulting from foreseeable breakage or typical consumption.

13.0 ASSESSMENT PROCEDURES FOR ACCURACY, PRECISION, AND COMPLETENESS

The QA/QC criteria for the analyses of samples for this project are presented in Annex A. Annex A contains criteria for method calibrations, data accuracy, and precision of data. Each method has a set of criteria to meet, and the methods of calculating the evaluation criteria are discussed in this section.

13.1 PRECISION

Precision is defined as the degree of mutual agreement among individual measurements made under prescribed conditions. Precision will use two different measurements depending on the number of data points being considered. Two data points will have the RPD calculated; three or more data points will use the RSD as a measure of the precision. Criteria for precision for each method have been included in Annex A.

Precision will be calculated for laboratory duplicate analysis using the following two equations:

$$1) \text{ RPD} = [(X_1 - X_2) / ((X_1 + X_2) / 2)] \times 100$$

Where: RPD = Relative Percent Difference
 X_1 = Highest Analytical Result
 X_2 = Lowest Analytical Result

$$2) \text{ RSD} = (\text{standard deviation} / \text{average value}) \times 100$$

Calculation of the precision for each analysis will be based on different criteria taken from the QA/QC Handbook (4) and the analytical methods. The precision for the halogen samples will be determined by the RPD calculated from the analysis of the MS/MSD. The MS/MSD will be used because the field samples have a history of very low concentrations. The precision of the SMVOC samples will be based on the RSD calculated from the analysis of the LCS, and the results of the LCS analyses will be used because of the historically low concentrations found in field samples. Precision for the metals emission samples will be based on the RPD of the LCS and duplicate analyses of one emission sample. Precision data for metals in the process samples will be based on analyses of MS/MSD and duplicate samples.

13.2 ACCURACY

Accuracy is the degree of agreement between a measurement and an accepted reference or true value. The accuracy of the ATLIC STB data will be determined from analysis of samples spiked

with a known concentration. The number of spiked samples and the spiking levels will be designated by the respective methods. Accuracy DQOs for each method are in Annex A.

The formula used to assess the accuracy of the LCS is:

$$\%R = (Q_{LCS} / Q_{KC}) \times 100$$

Where: %R = Percent Recovery

Q_{LCS} = Quantity of Analyte Found in the LCS

Q_{KC} = Known Concentration of the LCS

The formula used to assess the accuracy of the MS/MSD samples is:

$$\%R = [(Q_{ss} - Q_{us}) / Q_s] \times 100$$

Where: %R = Percent Recovery

Q_{ss} = Quantity of Analyte Found in the Spike Sample

Q_{us} = Quantity of Analyte Found in the Unspiked Sample

Q_s = Quantity of Added Spike

Calculation of the accuracy for each analysis will be based on different criteria taken from the QA/QC Handbook (4) and the analytical methods. Determination of accuracy for samples will be determined by the:

- %R calculated from the analysis of the MS/MSD for the halogen samples.
- %R calculated from the analysis of the LCS for the SMVOC samples.
- Analysis of the LCS for the accuracy of the metals emission samples.
- Analysis of the LCS for the PCDD/PCDF samples.
- %R from the analysis of the LCS and MS/MSD for the SVOC analyses in the process samples.

13.3 COMPLETENESS

Completeness is defined as the amount of valid data for an STB compared to the amount that was expected to be obtained under optimal conditions. The completeness objective here is to have 100 percent of the data valid for three performance runs for each STB (i.e., acceptable results must be obtained for three performance runs). The completeness objective for the entire monitoring project is to obtain a certain amount of data needed to complete the statistical design [see QA/QC Handbook (4)].

Completeness will be reported as the percentage of all measurements judged to be valid, and every attempt will be made to ensure that the data to be generated is valid. If data appear questionable based on circumstances observed during the field sampling, additional runs will be completed as soon as the system can be reset to ensure three successful performance runs are completed. Furthermore, in reality, some samples may be lost in laboratory accidents, and some results may be qualified based on laboratory QC procedures.

The following formula will be used to calculate a percent completeness:

$$C = (V/T) \times 100 \%$$

Where: C = Percent Completeness
V = Number of Measurements Judged Valid
T = Total Number of Planned Measurements

14.0 AUDIT PROCEDURES, CORRECTIVE ACTION, AND QUALITY ASSURANCE REPORTING

The ATLIC STB QA program will comply with EPA and state requirements for audits, which include performance and system audits as independent checks on the quality of data obtained from sampling, analysis, and data gathering activities. The procedures and techniques in place will ensure that the audit is representative of the measurement processes during normal operations. Either type of these two audits may show the need for corrective action.

14.1 PERFORMANCE AUDITS

A performance audit checks the performance or accuracy of the measurements being made. The sampling and analysis segments of the project are checked in a performance audit. Sampling performance audits will be accomplished through observation of the sampling operations by the regulatory agency representative and the Sampling Subcontractor QA Officer. For this purpose, an audit cylinder or spiked audit samples may be supplied by the DSHW during the ATLIC STB. In the event an audit cylinder is supplied, it will be sampled and analyzed in the same manner as the field samples. If a spiked sample is supplied, it will be extracted and analyzed according to the same methods used for the field samples.

14.2 SYSTEM AUDITS

A system audit involves observations by a subcontractor or regulatory agency to ascertain that the work is being performed in accordance with the methods specified in this QAPP.

14.2.1 Field Audit

The Sampling Subcontractor QA Officer will observe all activities to ensure that the QAPP is being followed and that sample COCs are accurate before sample shipment. The Sampling Subcontractor QA Officer will report any discrepancies to the STC, complete an STB QA checklist, maintain a log of discrepancies for the STC and the QA Director, and attend performance run meetings.

Representatives from the DSHW are expected to be on-site to observe all sampling activities. The point of contact for federal and state environmental regulatory agencies staff during the ATLIC STB will be the Test Director or his designee.

During each performance run, the sampling subcontractor performs a system audit, which consists of an inspection and review of the total sampling system, including:

- Setting up a pretest leak check of the sampling trains.
- Isokinetic sampling check (if required).
- Final leak checks of the sampling train.
- Sample recovery.

Results of the leak checks are noted on the field data sheets while the remaining item checks are documented on the audit checklist. When necessary, audit samples are analyzed along with the test samples.

14.2.2 Laboratory Audit

The Test Director will direct that an audit of each laboratory be conducted to ascertain that work is performed in accordance with the methods specified in the QAPP. Auditors will be selected from the EG&G Environmental organization, TOCDF QC Inspectors, or the sampling subcontractor's QC team.

14.3 CORRECTIVE ACTION

The need for corrective action will occur when a circumstance arises that adversely affects the quality of the data output. In most instances, the personnel conducting the field work and the laboratory analysis are in the best position to recognize problems that will affect data quality. Awareness on their part can detect minor instrument changes, drifts, or malfunctions that can then be corrected, thus preventing a major breakdown of the system. They will be in the best position to decide upon the proper corrective action and to initiate it immediately, thus minimizing data loss. Therefore, the field sampling and laboratory analysis personnel will have the prime responsibility for recognizing the need for a nonconformance report. The personnel identifying or originating a nonconformance report will document each nonconformance. For this purpose, a variance log, a testing procedure record, a notice of equipment calibration failure, results of laboratory analysis QC tests, an audit report, an internal memorandum, or a letter will be used, as appropriate.

15.0 REFERENCES

- (1) ***Test Methods for Evaluating Solid Waste, Physical/Chemical Methods***, 3rd Edition including Update III, USEPA, SW-846, December 1996.
- (2) ***Hazardous Waste Combustion Unit Permitting Manual, Component 2***, "How to Review A Quality Assurance Project Plan," U.S. EPA Region 6, Center for Combustion Science and Engineering, January 1998.
- (3) ***EPA Guidance for Quality Assurance Project Plans***, EPA QA-G-5, December 2002.
- (4) ***Handbook: Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration***, EPA/625/6-89/023, January 1990.
- (5) **Attachment 20 to the TOCDF RCRA Permit, CEMS Monitoring Plan**, EG&G Defense Materials, Inc., TOCDF, **CDRL-06**.
- (6) Title 40, ***Code of Federal Regulations***, Part 60, Appendix A, "Test Methods."
- (7) ASTM International Method D3370, "Standard Practices for Sampling Water from Closed Conduits."
- (8) **Attachment 6 to the TOCDF RCRA Permit, Instrument Calibration Plan**, EG&G Defense Materials, Inc., TOCDF.
- (9) ***Quality Assurance Handbook for Air Pollution Measurement Systems; Volume III - Stationary Source Specific Methods***, EPA-600/4-77-027b.
- (10) ***USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Review***, EPA-540-R-04-004, October 2004.
- (11) ***USEPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review***, EPA-540-R-00-006, June 2001.
- (12) ***USEPA Analytical Operations/Data Quality Center National Functional Guidelines for Chlorinated Dioxin/Furan Data Review***, EPA-540-R-02-003, August 2002.
- (13) American Society for Testing and Materials, ASTM SI-10, "International System of Units."

SURROGATE TRIAL BURN PLAN

FOR THE AREA 10 LIQUID INCINERATOR

APPENDIX A

ANNEX A

QA/QC OBJECTIVES FOR ANALYTICAL METHODS

REVISION 0

January 4, 2010

TABLE OF CONTENTS

1.0 INTRODUCTION	ANNEX A-1
2.0 VOLATILE ORGANIC COMPOUNDS IN EXHAUST GAS	ANNEX A-2
2.1 SUMMARY QA/QC CRITERIA FOR SMVOC/CONDENSATE (5041A)	ANNEX A-2
2.2 LIMIT OF QUANTITATION FOR SMVOC TUBES/CONDENSATE	ANNEX A-3
3.0 PCDDs/PCDFs SAMPLING AND ANALYSIS METHODS	ANNEX A-5
3.1 SUMMARY QA/QC CRITERIA FOR DIOXINS BY METHOD 0023 A/8290	ANNEX A-5
3.2 SUMMARY QA/QC CRITERIA FOR DIOXINS BY METHOD 8290	ANNEX A-6
3.3 LIMIT OF QUANTIFICATION FOR PCDDs/PCDFs	ANNEX A-7
4.0 HALIDE EMISSIONS	ANNEX A-8
5.0 METHOD 6020A ICP/MS	ANNEX A-9
5.1 SUMMARY QA/QC CRITERIA	ANNEX A-9
5.2 METHOD 6020A LOQS	ANNEX A-10
6.0 MERCURY ANALYSIS METHODS (7470A)	ANNEX A-11
7.0 VOLATILE ORGANIC COMPOUNDS IN PROCESS SAMPLES (8260B)	ANNEX A-12
7.1 SUMMARY OF QC AND CALIBRATION CRITERION FOR METHOD 8260B VOLATILES	ANNEX A-12
7.2 CONTROL LIMITS FOR PROCESS SAMPLES BY METHOD 8260B	ANNEX A-13
8.0 SEMI-VOLATILE ORGANIC COMPOUNDS IN PROCESS SAMPLES	ANNEX A-14
8.1 SUMMARY OF SVOC QC AND CALIBRATION CRITERION FOR METHOD 8270C	ANNEX A-14
8.2 HISTORICAL CONTROL LIMITS FOR METHOD 8270C	ANNEX A-15
9.0 REFERENCES	ANNEX A-16

1.0 INTRODUCTION

QA/QC OBJECTIVES FOR ANALYTICAL METHODS

These Quality Assurance/Quality Control (QA/QC) objectives are prepared based on the input from the laboratories performing the analyses for the Area 10 Liquid Incinerator (ATLIC) Surrogate Trial Burn (STB). The objectives were developed from the guidance provided in the EPA reference methods (1, 2, 3), EPA Guidance for Quality Assurance Project Plans (4), each laboratory QA program, and guidance in the EPA QA/QC Handbook (5). The DSHW will be notified of any changes to these tables when they occur.

2.0 VOLATILE ORGANIC COMPOUNDS IN EXHAUST GAS

2.1 Summary QA/QC Criteria for SMVOC/Condensate (5041A)

QUALITY PARAMETER	METHOD/FREQUENCY	CRITERIA	CORRECTIVE ACTION
Field/Trip Blanks	1 per run	• Lowest standard	Report and narrate.
Lab Blanks	1 per analytical batch	• Lowest standard	Correct problem, reanalyze.
Tuning Criteria	Prior to calibration and every 12-hour period.	Method 5041A tuning criteria	Correct problem and repeat tune
Initial Calibration	Minimum of five levels	Relative Standard Deviation (RSD) of Relative Response Factor (RRF) $\leq 30\%^*$ RSD $\leq 15\%^{**}$	Correct problem, reanalyze.
	System Performance Check Compounds (SPCC) RRF	±0.30 for chlorobenzene and 1,1,2,2-tetrachloroethane; ±0.10 for Bromoform, chloromethane, and 1,1-dichloroethane	Correct problem, reanalyze.
	Continuing Calibration Compounds (CCC)	RRF $\leq 30\%$ RSD* RRF $\leq 15\%$ RSD**	Correct problem, reanalyze.
Continuing Calibration	SPCC RRF 12 hours	Same as initial	Correct problem, reanalyze.
	CCC 12 hours	$\pm 25\%$ Difference (%D)	Correct problem, reanalyze.
Consistency in Chromatography	Internal standard RRF	± 30 Seconds	Correct problem, narrate.
	Internal standards	60% to 140%	Correct problem, narrate.
Laboratory Control Samples (LCS)	Accuracy	70% to 130% Recovery (%R) 50% to 150% R ²	Correct problem, reanalyze.
	Precision	RPD $\leq 25\%$ $\leq 50\%$ RPD**	Correct problem, reanalyze.
Continuing Accuracy Check, Surrogates	Dibromofluoromethane Toluene-d ₈ 4-Bromofluorobenzene 1,2-Dichloroethane-d ₂	SMVOC Tube %R limits are: 50 to 150 % Condensate %R limits are: 70 to 130 %	Correct problem, narrate.
Audit Samples	As supplied	50 to 150 %	
Condensate	Matrix Spike/Matrix Spike Duplicate (MS/MSD)	50 to 150 %R RPD $\leq 35\%$	Reanalyze.
Holding Time		14 Days	Contact client.

* Criteria for 1,1,2,2-tetrachloroethane, 1,1-dichloroethene, 1,2,3-trichloropropane, 1,2-dichloropropane, 1,3-butadiene, 2-hexanone, 4-methyl-2-pentanone, bromoform, chloroform, ethylbenzene, toluene, and vinyl chloride.

** Criteria for remaining Compounds

2.2 Limit of Quantitation for SMVOC Tubes/Condensate

COMPOUND	TUBE LOQ (ng)	CONDENSATE LOQ * (ng)	PRIMARY ION M/E AMU
Acetone	50	400	58
Benzene	10	80	78
Bromobenzene	10	80	77
Bromochloromethane	10	80	128
Bromodichloromethane	10	80	83
Bromoform	10	80	173
Bromomethane	10	80	94
2-Butanone	50	400	91
Carbon Disulfide	10	80	76
Carbon Tetrachloride	10	80	117
Chlorobenzene	10	80	112
Chloroethane	10	80	64
Chloroform	10	80	83
Chloromethane	10	80	50
2-Chloropropane	10	80	91
2-Chlorotoluene	10	80	126
4-Chlorotoluene	10	80	91
Cumene (<i>iso</i> -propylbenzene)	10	80	105
Dibromochloromethane	10	80	129
1,2-Dibromoethane	10	80	107
Dibromomethane	10	80	93
<i>cis</i> -1,4-Dichloro-2-butene	10	80	53
<i>trans</i> -1,4-Dichloro-2-butene	10	80	53
Dichlorodifluoromethane	10	80	85
1,1-Dichloroethane	10	80	63
1,2-Dichloroethane	10	80	62
1,1-Dichloroethene	10	80	96
<i>cis</i> -1,2-Dichloroethene	10	80	96
<i>trans</i> -1,2-Dichloroethene	10	80	96
1,2-Dichloropropane	10	80	63

LOC DE

ALIC SIB Plan - Rev. 0
Appendix A
January 4, 2010

2.2 Limit of Quantitation for SMVOC Tubes/Condensate (continued)

COMPOUND	TUBE LOQ (ng)	CONDENSATE LOQ * (ng)	PRIMARY ION M/E AMU
1,3-Dichloropropane	10	80	76
2,2-Dichloropropane	10	80	77
1,1-Dichloropropene	10	80	75
<i>cis</i> -1,3-Dichloropropene	10	80	75
<i>trans</i> -1,3-Dichloropropene	10	80	75
Ethylbenzene	10	80	106
n-Hexane	10	80	57
2-Hexanone	50	400	58
Iodomethane (Methyl Iodide)	10	80	142
Methylene chloride	10	80	84
4-Methyl-2-Pentanone	50	400	43
Propylbenzene	10	80	120
Styrene	10	80	104
1,1,1,2-Tetrachloroethane	10	80	131
1,1,2,2-Tetrachloroethane	10	80	83
Tetrachloroethene	10	80	164
Toluene	10	80	92
1,1,1-Trichloroethane	10	80	97
1,1,2-Trichloroethane	10	80	97
Trichloroethene	10	80	130
Trichlorofluoromethane	10	80	101
1,2,3-Trichloropropane	10	80	110
1,1,2-Trichloro-1,2,2-trifluoroethane	10	80	151
Vinyl Chloride	10	80	62
m,p- Xylene	10	80	106
o-Xylene	10	80	106

Note:

The term Limit of Quantitation (LOQ) refers to the laboratory's standard Reporting Limit.

* SW-846 Method LOQ - ng reported are based on a 5 ml water equivalent.

3.0 PCDDs/PCDFs SAMPLING AND ANALYSIS METHODS

3.1 Summary QA/QC Criteria for Dioxins by Method 0023A/8290

QUALITY PARAMETER	METHOD/FREQUENCY	CRITERIA	CORRECTIVE ACTION
Initial Calibration (ICAL)	Five-point calibration Initially and as required.	Natives RSD $\leq 25\%$, except for OCDF $< 30\%$	Evaluate system. Recalibrate.
Continuing Calibration (CCAL)	Midpoint standard at start of each 12 hour sequence	%D of natives $\leq 25\%$ from avg RRF (ICAL), except for OCDF $< 30\%$	Evaluate system. Reanalyze CCAL. Recalibrate as necessary.
Reagent Blank	1 per batch	$< 5 \times \text{LOQ}$	Reanalyze and/or narrate.
Field Blank	1 per AIB	$< 5 \times \text{LOQ}$	Reanalyze and/or narrate.
Method Blank	1 per batch	$< 5 \times \text{LOQ}$	Reanalyze and/or narrate.
Window Defining Mix (WDM) Column Performance Standard Mixture (CPSM)	Once per 12 hours prior to sample analysis	Used to set retention times. CPSM must have $\pm 25\%$ valley resolution for 2,3,7,8-TCDD	Readjust windows. Evaluate system. Perform maintenance. Reanalyze WDM CPSM
Method Blanks	1 per analytical batch	$< \text{LOQ}$ except for OCDD $< 5 \times \text{LOQ}$	Reanalyze if appropriate. Assess impact on data. Process archive sample if necessary.
I.C.S.	1 per analytical batch	60 to 140 % for target analytes	Review internal standards. Assess impact on data. Process archive sample if necessary.
Field Surrogates	Every sample	70 to 130 %	Check chromatogram for interference. Assess impact on data and narrate.
Internal Standards	Every sample	40 to 135 % for tetra through hexa isomers; 25 to 150 % for hepta and octa isomers.	Check chromatogram for interference. Check instrument and reanalyze if necessary. Check signal-to-noise, if $< 10:1$, process archive sample. Assess impact on data and narrate.
Audit Sample	As Supplied	70 to 130 %	
Holding Time		30 Days Extraction 45 Days Analysis	

Notes: The term LOQ refers to the laboratory's standard Reporting Limit.

RSD = Relative Standard Deviation, OCDF = Octachlorodibenzofuran, RRF = Relative Response Factor.

%D = Percent Difference, TCDD = Tetrachlorodibenzo-p-dioxin, OCDD = Octachlorodibenzo-p-dioxin

TCDF

AIB SIB Plan - Rev. 0
Appendix A
January 4, 2010

3.2 Summary QA/QC Criteria for Dioxins by Method 8290

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
ICAL	Five point calibration Initially and as required.	Int Std RSD \leq 30 % Natives RSD \leq 20 %	Evaluate system. Recalibrate.
CCAL	Midpoint Standard at Start of Each 12 hour sequence	%D of IS \leq 30 % from avg RRF (ICAL): %D of natives \leq 20 % from avg RRF (ICAL).	Evaluate system. Reanalyze CCAL. Recalibrate as necessary.
WDM CPSM	Once per 12 hours prior to sample analysis.	Used to set retention times CPSM must have \leq 25 % valley resolution for 2,3,7,8-TCDD	Readjust windows. Evaluate system. Perform maintenance. Reanalyze WDM/CPSM.
Method Blanks	1 per analytical batch	LOQ, except for OCDD \leq 5 X LOQ	Reanalyze. Assess impact on data.
LCS	1 per analytical batch	60 to 140 % for target analytes	Review internal standards. Assess impact on data. Reextract and/or reanalyze as necessary.
MS/MSD	1 per ATB	60 to 140 % recovery for target analytes: RPD \leq 20%	Review LCS. Assess impact on data. Narrate.
Internal Standards	Every sample	40 to 135 % for tetra through hexa isomers 25 to 150 % for hepta and octa isomers	Check chromatogram for interference. Check instrument and reanalyze. Check signal-to-noise, if 10:1, reextract. Assess impact on data and narrate.
Holding Time		30 Days Extraction 45 Days Analysis	

Note: The term LOQ refers to the laboratory's standard Reporting Limit.

3.3 Limit of Quantitation for PCDDs/PCDFs

COMPOUND	METHOD 0023A/8290 (pg/Fraction)	METHOD 8290 (ng/L)
2,3,7,8-TCDF	5	0.005
1,2,3,7,8-PeCDF	25	0.025
2,3,4,7,8-PeCDF	25	0.025
1,2,3,4,7,8-HxCDF	25	0.025
1,2,3,6,7,8-HxCDF	25	0.025
1,2,3,7,8,9-HxCDF	25	0.025
2,3,4,6,7,8-HxCDF	25	0.025
1,2,3,4,6,7,8-HpCDF	25	0.025
1,2,3,4,7,8,9-HpCDF	25	0.025
OCDF	50	0.050
2,3,7,8-TCDD	5	0.005
1,2,3,7,8-PeCDD	25	0.025
1,2,3,4,7,8-HxCDD	25	0.025
1,2,3,6,7,8-HxCDD	25	0.025
1,2,3,7,8,9-HxCDD	25	0.025
1,2,3,4,6,7,8-HpCDD	25	0.025
OCDD	50	0.050

TCDF

ATTC STB Plan – Rev. 0
Appendix A
January 4, 2010

4.0 HALIDE EMISSIONS

Summary QA/QC Criteria for Hydrogen Chloride and Chlorine (9057)

QUALITY PARAMETER	METHOD/FREQUENCY	CRITERIA	CORRECTIVE ACTION
Method Blank	1 per analytical batch	< LOQ	Reanalyze. Assess impact on data. Narrate.
Field Blank	1 per SWDT	< Low standard	Narrate
Initial Calibration	4-point calibration and a blank. Initial/as required	Correlation coefficient ≥ 0.995	Evaluate system. Recalibrate.
Continuing Calibration	Midpoint standard every 10 samples and at end of sequence	90 to 110 %	Evaluate system. Repeat calibration check. Recalibrate. Reanalyze affected samples.
Precision/ Accuracy	LCS per batch	90 to 110 %	Check calculations. Reanalyze. Assess impact on data. Narrate.
	MS/MSD per batch	85 to 115 %R. RPD ≤ 25 %	Check calculations. If RPD is in control, accept data and narrate. If RPD is out of control, reanalyze.
Audit Sample	As provided	90 to 110 %	Check calculations. Reanalyze and Narrate.
LOQ	Hydrogen Chloride Chlorine	1.0 mg/train 1.0 mg/train	
Holding Time		28 days	

Note: The term LOQ refers to the laboratory's standard Reporting Limit.

5.0 METHOD 6020A ICP/MS

5.1 Summary QA/QC Criteria

QUALITY PARAMETER	METHOD/FREQUENCY	CRITERIA	CORRECTIVE ACTION
Instrument Tune	Daily, prior to calibration and sample analysis	Mass resolution > 1.0 amu; $\pm 10\%$ peak height; Mass calib. ± 0.1 amu	Retune instrument. Repeat tune solution and analysis.
Initial Calibration	Blank and at least one standard.	ICV $\pm 10\%$ of expected value	Evaluate and reanalyze ICV Recalibrate.
Calibration Blank	After ICV and CCV	$< \text{LOQ}$	Clean system. Rerun. Reanalyze affected samples.
CCV	Every 10 samples and end of run sequence	$\pm 10\%$ of expected value	Reanalyze CCV. Recalibrate. Reanalyze samples.
Method Blank	1 per analytical batch	$< \text{LOQ}$	Reanalyze. Recalibrate as necessary.
Internal Standard	Each sample	30 to 130 %R	Reanalyze and/or narrate.
Duplicate Control Sample (DCS) *	1 per analytical batch	75 to 125 %R, RPD $\leq 25\%$	Check calculations. Assess impact on data. Reextract and reanalyze as necessary. Narrate.
MS MSD *	1 per analytical batch	75 to 125 %R, RPD $\leq 25\%$	Check calculations. Reanalyze. Assess impact on data.
Duplicate Analyses	1 per analytical batch	RPD $\leq 20\%$	Check calculations. Reanalyze. Assess impact on data.
Holding Time		180 Days to analysis	

Note: amu = atomic mass unit

ICV = Initial Calibration Verification

CCV = Continuing Calibration Verification

* For air matrices, the QC samples per batch include a DCS only (no MS MSD)

5.2 Method 6020A LOQs

ELEMENT	Metal Emissions, LOQ (µg/Sample)	Aqueous Samples, LOQ (mg/L)
Aluminum	7.5	1.0
Antimony	0.30	0.050
Arsenic	0.30	0.050
Barium	0.15	0.025
Beryllium	0.15	0.025
Boron	7.5	1.0
Cadmium	0.15	0.025
Chromium	0.30	0.050
Cobalt	0.15	0.025
Copper	0.30	0.050
Lead	0.15	0.025
Manganese	0.15	0.025
Nickel	0.30	0.050
Selenium	0.45	0.050
Silver	0.15	0.025
Thallium	0.15	0.025
Tin	1.5	0.25
Vanadium	1.5	0.25
Zinc	0.75	0.12

6.0 MERCURY ANALYSIS METHODS (7470A)
Summary QA/QC Criteria
SW 846 Methods 7470A, Mercury by Cold Vapor AAS

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Initial Calibration	Blank and five standards. Daily before analysis	Corr. Coefficient \geq 0.995	Evaluate system. Recalibrate.
Calibration Blank	After ICV and each CCV	- LOQ	Rerun. Clean system. Reanalyze affected samples.
ICV	After calibration	80 to 120 %	Reanalyze ICV. Recalibrate.
CCV	Every 10 samples and end of run sequence	80 to 120 %	Reanalyze. Recalibrate. Reanalyze affected samples.
Method Blank	1 per analytical batch	- LOQ	Reanalyze. Recalibrate as necessary. Reanalyze.
LCS	1 per analytical batch	80 to 120 %	Check calculations. Reextract and reanalyze as necessary. Assess impact on data. Narrate.
MS/MSD	1 per analytical batch (20 samples)	75 to 125 %	Check calculations. Evaluate LCS. Assess impact on data.
Stack samples. MS on one FH fraction	1 per analytical batch	75 to 125 %	Check calculations. Reanalyze. Assess impact on data.
LOQ	Multiple Metals Train Aqueous Samples	0.2 µg/fraction 0.0002 mg/L	
Holding Time		14 days See Table A-7-1.	

Note: The term LOQ refers to the laboratory's standard Reporting Limit.

7.0 VOLATILE ORGANIC COMPOUNDS IN PROCESS SAMPLES (8260B)

7.1 Summary of QC and Calibration Criterion for Method 8260B (Aqueous)

QUALITY PARAMETER	METHOD/FREQUENCY	CRITERIA	CORRECTIVE ACTION
Method Blank	1 per analytical batch	< LOQ ¹	Reanalyze. Assess impact on data. Narrate.
Instrument Tune	Every 12 hours	Refer to method.	Retune instrument. Repeat BFB analysis.
Initial Calibration. Five point	SPCC RRF	> 0.10 Chloromethane > 0.10 1,1-DCA > 0.10 Bromoform > 0.30 Chlorobenzene 0.30 1,1,2,2-TCA	Evaluate system. Recalibrate.
	CCC	RSD \leq 30%	
	Compounds \leq 15% RSD	Average RF if 80 % of the compounds meet the criteria	
Continuing Calibration	SPCC RRF	Same as initial	Evaluate system. Repeat calibration check.
	CCC	< 20 % drift	Recalibrate. Reanalyze affected samples.
	Every 12 hours	RSD \leq 50 % for non-CCCs ²	Evaluate system. Repeat calibration check.
Internal Standards	RRT	\leq 0.50 or 30 seconds	Check sensitivity of system.
	Recovery	50 to 200 %R	Reanalyze standard.
Precision. Accuracy	LCS, MS-MSD per batch Surrogates	Historical lab data (See Table 7.2)	Check calculations. Reanalyze. Assess impact on data. Narrate.
Holding Time		14 days	

Note: The term LOQ refers to the laboratory's standard Reporting Limit.

¹ Except for common lab contaminants – methylene chloride, acetone, and 2-butanone may be reported with qualifiers if the concentration of the analyte is less than five times the LOQ. Such action must be addressed in the case narrative.

² Allowance for up to 6 target analytes \geq 50%.

7.2 Control Limits for Process Samples by Method 8260B

	COMPOUND	ACCURACY (% RECOVERY)	PRECISION RPD
LCS			
	1,1-Dichloroethene	66 to 130	NA
	Benzene	77 to 121	NA
	Trichloroethene	75 to 116	NA
	Toluene	78 to 120	NA
	Chlorobenzene	80 to 120	NA
MS/MSD			
	1,1-Dichloroethene	66 to 130	32
	Benzene	77 to 121	21
	Trichloroethene	75 to 116	24
	Toluene	78 to 120	25
	Chlorobenzene	80 to 120	20
Surrogates			
	1,2-Dichloroethane-d4	64 to 139	NA
	Toluene-d8	72 to 128	NA
	4-Bromofluorobenzene	66 to 121	NA

Notes: Historical limits for the method are reported here. Current established limits will be used for the evaluation of the data as required by SW-846 (1).

NA = Not Applicable

8.0 SEMI-VOLATILE ORGANIC COMPOUNDS IN PROCESS SAMPLES

8.1 Summary of SVOC QC and Calibration Criterion for Method 8270D

QUALITY PARAMETER	METHOD/FREQUENCY	CRITERIA	CORRECTIVE ACTION
Method Blank	1 per analytical batch	< LOQ *	Reanalyze. Assess data. Narrate.
Instrument Tune	Every 12 hours, initially and as required	As per 8270C	Retune instrument. Repeat DFTPP analysis.
Initial Calibration. Five point	SPCC RRF	± 0.050	Evaluate system. Recalibrate.
	CCC	$RSD \leq 30\%$	
	Compounds $\leq 15\%$ RSD	Average RRF if 80 % of the compounds meet the criteria	
Continuing Calibration	SPCC RRF	Same as initial	Evaluate system. Repeat calibration check.
	CCC	$RSD \leq 20\%$	Recalibrate. Reanalyze affected samples.
Internal Standards	RRT	± 30 seconds	Check sensitivity of system. Reanalyze standard.
	Accuracy	50 to 200 %R	
Precision/ Accuracy	LC \$, MS/MSD per batch Surrogates	Historical lab data (See Table 8.2)	Check calculations. Reanalyze. Assess data. Narrate.
LOQ		0.050 mg/L to 0.25 mg/L	
Holding Time		Extraction - 14 days Analysis - 40 days	

Note: The term LOQ refers to the laboratory's standard Reporting Limit.

* Except for common lab contaminants, Phthalate esters may be reported with qualifiers if the concentration of the analyte is less than five times the LOQ. Such action must be addressed in the case narrative.

**8.2 Historical Control Limits for Method 8270D
for Semi-Volatile Organic Compounds in Aqueous Samples**

	COMPOUND	%R AQUEOUS
LCS	Acenaphthene	62 to 103
	4-Chloro-3-methylphenol	60 to 100
	2-Chlorophenol	48 to 102
	1,4-Dichlorobenzene	51 to 91
	2,4-Dinitrotoluene	60 to 113
	4-Nitrophenol	18 to 63
	N-nitroso-di-n-propylamine	61 to 105
	Pentachlorophenol	35 to 118
	Phenol	16 to 56
	Pyrene	47 to 126
	1,2,4-Trichlorobenzene	57 to 97

	COMPOUND	%R AQUEOUS	RPD AQ
MS/MSD	Acenaphthene	59 to 103	15
	4-Chloro-3-methylphenol	60 to 100	26
	2-Chlorophenol	48 to 102	34
	1,4-Dichlorobenzene	51 to 91	29
	2,4-Dinitrotoluene	60 to 113	26
	4-Nitrophenol	18 to 63	67
	N-nitroso-di-n-propylamine	61 to 105	26
	Pentachlorophenol	35 to 118	39
	Phenol	16 to 56	71
	Pyrene	47 to 126	36
	1,2,4-Trichlorobenzene	57 to 97	27
Surrogates	2-Chlorophenol-d ₄	25 to 101	NA
	1,2-Dichlorobenzene-d ₄	49 to 99	NA
	2-Fluorobiphenyl	47 to 106	NA
	2-Fluorophenol	10 to 70	NA
	Nitrobenzene-d ₅	50 to 102	NA
	Phenol-d ₅	10 to 47	NA
	Terphenyl-d ₁₄	40 to 125	NA
	2,4,6-Tribromophenol	21 to 127	NA

Note: Historical limits for the method are reported here. Current established limits will be used for the evaluation of the data as required by SW-846 (1).

9.0 REFERENCES

- (1) *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition including Update III. USEPA, SW-846. December 1996.
- (2) Title 40. *Code of Federal Regulations*. Part 60. Appendix A. "Test Methods".
- (3) Title 40. *Code of Federal Regulations*. Part 136. Appendix A. "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater".
- (4) *EPA Requirements for Quality Assurance Project Plans*. EPA QA/R-5. November 1999.
- (5) *Handbook: Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration*. EPA 625/6-89/023. January 1990.

SURROGATE TRIAL BURN PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX A

ANNEX B

EXAMPLE DATA FORMS

REVISION 0

January 4, 2010

TABLE OF CONTENTS

Chain of Custody Record.....	Annex B-1
Method 5/26A Field Data Sheets.....	Annex B-2
Method 29 Field Data Sheets.....	Annex B-4
Method 0023A Field Data Sheets.....	Annex B-6
Method 0031 Field Data Sheets.....	Annex B-8
URS Source Sampling Temperature Readout Calibration Form.....	Annex B-10
Five-Point Dry Gas Meter Calibration Form.....	Annex B-11
Three-Point Dry Gas Meter Calibration Form.....	Annex B-12
VOST Console DGM & Thermocouple Calibration Form.....	Annex B-13
S-Type Pitot Tube Inspection Sheet.....	Annex B-14
Pitot Tube Calibration Data Sheet.....	Annex B-15
Potable Barometer Calibration Data Sheet.....	Annex B-16
Balance Calibration.....	Annex B-17
Field Balance Calibration.....	Annex B-18
URS CEMS Operation Log.....	Annex B-19

Chain of Custody Record

Samples from Multi-Metals Sampling Trains

Page ____ of ____

[illegible]

[illegible]~~ATTC-STB Plan - Rev. 0, Appendix A~~

Project No. _____

Operator Initials _____

PM/HCl/Cl₂
EPA Method 5
SW-846 Method 0050

Run No. _____

Condition no. _____

Date: _____

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	Initial Wt. (g)	Net Gain (g)
1	0.1 N H ₂ SO ₄	50	KO	-	=	
2	0.1 N H ₂ SO ₄	100	GS	-	=	
3	0.1 N H ₂ SO ₄	100	GS	-	=	
4	0.1 N NaOH	100	Mod	-	=	
5	0.1 N NaOH	100	Mod	-	=	
6	Silica Gel	~ 300g	Mod	-	=	
				Total Net Gain (g)	=	

Appendix B - 3

Sample Log

Sample ID Number	No. of Sample Containers	Description
TOCDF-MPF-Stk-____-M5-PNR		Probe and Nozzle Rinse
TOCDF-MPF-Stk-____-M5-Filt		Filter
TOCDF-MPF-Stk-____-M0050-AcidImp		Acid Impinger Catch
TOCDF-MPF-Stk-____-M0050-AlkImp		Alkaline Impinger Catch

Appendix A

Sample Recovery Checklist**AT LOCATION**

_____ Rinse and brush probe and nozzle three times with acetone into PNR bottle.

_____ Rinse the transfer line three times with water into the Acid Impinger (AcidImp) bottle.

IN LABORATORY

_____ Separate filter holder and place filter in clean pre-rinsed, glass petri dish. Complete filter (Filt) sample label.

_____ Rinse front half of filter holder with acetone into PNR bottle. Complete probe and nozzle rinse (PNR) sample label.

_____ Rinse back half of filter holder with deionized water into the Acid Impinger (AcidImp) bottle.

_____ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

_____ Pour contents of 1st, 2nd and 3rd (containing acid) impingers into the Acid impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete Acid Impinger (AcidImp) Sample Label._____ Pour the contents of the 5th and 6th impingers (containing NaOH) into the alkaline impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete alkaline impinger (AlkImp) sample label.

_____ Log samples into logbook and store appropriately

[illegible]

A1110 STB Plan - Rev. 0, Appendix A

Project No. _____

Operator Initials _____

Multi-Metals EPA Method 29

Run No. _____

Condition no. _____

Date: _____

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	Initial Wt (g)	Net Gain (g)
1	-	-	K/O	-	=	
2	Nitric/Peroxide	100	Mod	-	=	
3	Nitric/Peroxide	100	GS	-	=	
4	-	-	Mod	-	=	
5	KMnO ₄ Soln	100	Mod	-	=	
6	KMnO ₄ Soln	100	Mod	-	=	
7	Silica Gel	~ 300g	Mod	-	=	
				Total Net Gain (g) =		

Sample Log

Sample ID Number	No. of Sample Containers	Description
TOCDF-STDT-Stk-____-M29-PNR		Probe and Nozzle Rinse
TOCDF-STDT-Stk-____-M29-Filt		Filter
TOCDF-STDT-Stk-____-M29-NI-A		Nitric Impinger - A
TOCDF-STDT-Stk-____-M29-NI-B		Nitric Impinger - B
TOCDF-STDT-Stk-____-M29-EIR		Empty Impinger Rinse
TOCDF-STDT-Stk-____-M29-Perm		Permanganate Impinger
TOCDF-STDT-Stk-____-M29-HClRns		HCl Rinse of Permanganate Impinger

Sample Recovery Checklist

AT LOCATION

_____ Rinse and brush probe and nozzle with 0.1 N nitric acid into PNR bottle.
Note - use teflon brush

_____ Rinse the transfer line three times with 0.1 N nitric acid into NI bottle.

IN LABORATORY

_____ Separate filter holder and place filter in clean petri dish. Complete Filt sample label.

_____ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label. Note: Exactly 100 mL of 0.1 N nitric acid will be used in the PNR rinse.

_____ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.


_____ Pour contents of first 3 impingers into the Nitric/peroxide impinger (NI) catch bottle(s). Rinse the impingers and connecting glassware with 0.1 N nitric acid into the NI bottle(s). Rinse the back half of the filter holder with 0.1 N nitric acid into this sample bottle as well. Complete the NI sample label(s). Note exactly 250 mL of 0.1 N nitric acid will be used in the NI rinse.

_____ Rinse the 4th (initially empty) impinger with 100 mL 0.1 N nitric acid into the empty impinger rinse (EIR) bottle. Complete EIR sample label.

_____ Pour the contents of the 5th and 6th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm). Rinse with 100 mL of permanganate solution and then 100 mL DI water. Complete Perm sample label

_____ Rinse the permanganate impingers with a total of 25 mL of 8 N HCl. Rinse the permanganate impingers with 200 mL DI water. Complete HClRns sample label. (Note, this is not required if there is no visible solid residue)

_____ Log samples into logbook and store appropriately

Sample Type – PCDD/PCDF (Method 0023A)		Start Time	Condition	Page of	
Plant Name – TOCDF		End Time	Run	Sampling Train Leak Rate (t ¹ @ in. Hg)	
Project Number –		Duration (min)	Operator	Initial	@
Date		PTCF	Nozzle ID	Final	@
Location (Source) MPF		DGMCF	Nozzle Dia (in)	Pitot Tube ID	
Duct Dimension(s)		Console No.	Kf	Pitot Tube Leak Check	
Stack Elevation (relative to Barometer)			ΔH@	Initial	(+) (-)
			Bar Press (in. Hg)	Final	(+) (-)
			Stat. Press. (in. H ₂ O)	Filter No	

[illegible]

Comments:

Project No. _____

Operator Initials _____

Dioxins and Furans

SW-846 – Method 0023A

Run No. _____

Condition no. _____

Date: _____

Moisture Determination

Impinger No.	Contents	Volume (mL)	Configuration	Final Wt (g) - Initial Wt. (g) = Net Gain (g)
1	-	-	K/O	- =
2	H ₂ O	100	G/S	- =
3	H ₂ O	100	Mod	- =
4	Silica Gel	~ 300g	Mod	- =
5				- =
6				- =
				Total Net Gain (g) =

Sample Log

Sample ID Number	No. of Sample Containers	Description
TOCDF-MPF-Stk-____-M0023A-PNR		Probe and Nozzle Rinse
TOCDF-MPF-Stk-____-M0023A-Filt		Filter
TOCDF-MPF-Stk-____-M0023A-CR		Condenser Rinse
TOCDF-MPF-Stk-____-M0023A-XAD		XAD

Sample Recovery Checklist

AT LOCATION

- _____ Rinse and brush the probe liner and nozzle into the PNR bottle: three times with acetone, twice with methylene chloride, and twice with toluene.
- _____ Rinse transfer line three times with acetone, twice with methylene chloride, twice with toluene into CR bottle.

IN LABORATORY

- _____ Separate filter holder and place filter in clean pre-rinsed, glass petri dish. Complete Filt sample label.
- _____ Seal XAD trap ends. Complete XAD sample label.
- _____ Rinse front half of filter holder into PNR bottle: three times with acetone, twice with methylene chloride, twice with toluene. Complete PNR sample label.
- _____ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section. DISCARD the impinger solution.
- _____ Rinse the back half of the filter holder, all connecting glassware and the coil condenser: three times with acetone, twice with methylene chloride and twice with toluene. Complete the CR sample label.
- _____ Log samples into logbook and place in refrigerator or ice chest.

Sample Type - Volatile Organics - Method 0031	Start Time	Condition	Page _____ of _____
Plant Name - TOCDF	End Time	Run	Bar. Press. (in. Hg)
Project Number -	Date	DGMCF	Elev. (Rel. to Bar.) (ft)
Location (Source) - MPF	Operator	Console No.	Amb. Temp (°F)

Pair No.	of	Tube Identification No.	Temperatures (°F)					Vacuum (°Hg)
Clock Time		Gas Volume (L)	Meter Pressure (H ₂ O)	Probe	Meter In	Meter Out	1st Cond.	2nd Cond.

Leak Checks (°Hg)	Pre-Test	Comments
	Post Test	

Pair No.	of	Tube Identification No.	Temperatures (°F)					Vacuum (°Hg)
Clock Time		Gas Volume (L)	Meter Pressure (H ₂ O)	Probe	Meter In	Meter Out	1st Cond.	2nd Cond.

Leak Checks (°Hg)	Pre-Test	Comments
	Post Test	

Pair No.	of	Tube Identification No.	Temperatures (°F)					Vacuum (°Hg)
Clock Time		Gas Volume (L)	Meter Pressure (H ₂ O)	Probe	Meter In	Meter Out	1st Cond.	2nd Cond.

Leak Checks (°Hg)	Pre-Test	Comments
	Post Test	

Pair No.	of	Tube Identification No.	Temperatures (°F)					Vacuum (°Hg)
Clock Time		Gas Volume (L)	Meter Pressure (H ₂ O)	Probe	Meter In	Meter Out	1st Cond.	2nd Cond.

Leak Checks (°Hg)	Pre-Test	Comments
	Post Test	

Project No. _____

Operator Initials _____

Volatile Organic Compounds

SW-846 – Method 0031

Run No. _____

Condition no. _____

Date: _____

Sample Log

Sample ID Number	Description
TOCDF-MPF-Stk-____-M0031-Set1-TnxA	Tenax Tube – A – Set 1
TOCDF-MPF-Stk-____-M0031-Set1-TnxB	Tenax Tube – B – Set 1
TOCDF-MPF-Stk-____-M0031-Set1-Ansb	Anasorb – Set 1
TOCDF-MPF-Stk-____-M0031-Set2-TnxA	Tenax Tube – A – Set 2
TOCDF-MPF-Stk-____-M0031-Set2-TnxB	Tenax Tube – B – Set 2
TOCDF-MPF-Stk-____-M0031-Set2-Ansb	Anasorb – Set 2
TOCDF-MPF-Stk-____-M0031-Set3-TnxA	Tenax Tube – A – Set 3
TOCDF-MPF-Stk-____-M0031-Set3-TnxB	Tenax Tube – B – Set 3
TOCDF-MPF-Stk-____-M0031-Set3-Ansb	Anasorb – Set 3
TOCDF-MPF-Stk-____-M0031-Set4-TnxA	Tenax Tube – A – Set 4
TOCDF-MPF-Stk-____-M0031-Set4-TnxB	Tenax Tube – B – Set 4
TOCDF-MPF-Stk-____-M0031-Set4-Ansb	Anasorb – Set 4
TOCDF-MPF-Stk-____-M0031-FB-TnxA	Tenax Tube – A – Set Blk
TOCDF-MPF-Stk-____-M0031-FB-TnxB	Tenax Tube – B – Set Blk
TOCDF-MPF-Stk-____-M0031-FB-Ansb	Anasorb – Set Blk
TOCDF-MPF-Stk-____-M0031-Condensate	Condensate – 40 ml Vial
TOCDF-MPF-Stk-____-M0031-Condensate-Bk	Condensate Blank – 40 ml Vial

Sample Recovery Checklist

- _____ Transfer VOST condensate into VOA vial. After fourth pair fill vial to capacity (no air bubbles) with HPLC water. Complete Sample Label for Condensate
- _____ Fill a different VOA vial with HPLC Water. Complete Sample Label for Condensate Blank
- _____ Reseal both Tenax tubes with provided caps and return to shipping container. Complete sample labels.
- _____ Reseal each Anasorb tube with provided caps and return to shipping container. Complete sample label.
- _____ Wrap each set of tubes in a ziplock baggie.
- _____ Log samples into logbook and store on ice:

Appendix B - 9

ATTN: STEB Dim - Rev. 11/1/2014 Appendix A

URS Source Sampling Temperature Readout Calibration Form
Per Reference _____

Operator _____
 Date _____

Readout ID Number _____
 Thermometer ID Number _____
 Voltage Generator ID Number _____

Temperature Readout Calibration	
Thermometer (°F) _____	Temperature Readout (°F) (after adjustment) _____

Temperature Readout Calibration Check									
Channel	Voltage (mV)	Temperature (°F)			Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference¹			Theoretical	Observed	Difference
1	0.0	32			5	-1.0	-10		
	1.0	77				0.0	32		
	3.0	165				1.0	77		
	7.0	341				2.0	121		
	15.0	692				3.0	165		
2	0.0	32			6	-1.0	-10		
	3.0	165				0.0	32		
	4.0	208				1.0	77		
	5.0	251				2.0	121		
	7.0	341				3.0	165		
3	0.0	32			7	-1.0	-10		
	3.0	165				0.0	32		
	4.0	208				1.0	77		
	5.0	251				2.0	121		
	7.0	341				3.0	165		
4	-1.0	-10							
	0.0	32							
	1.0	77							
	2.0	121							
	3.0	165							

¹ Acceptable difference is $\pm 5^{\circ}\text{F}$ for temperatures below 1000°F and $\pm 10^{\circ}\text{F}$ for temperatures above 1000°F .

Five-Point Dry Gas Meter Calibration Form (Against Critical Orifice)

Console ID _____ Date: _____ Signature: _____

		Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B	Run 4A	Run 4B	Run 5A	Run 5B	
Critical Orifice	Identification Number											
	K Factor											
Subject DGM	DGM Initial Reading (ft ³)											
	DGM Final Reading (ft ³)											
	Temperature (°F)	Inlet Initial										
		Outlet Initial										
		Inlet Final										
		Outlet Final										
Test Time (minutes)												
Orifice Manometer, ΔH (" H ₂ O)												
Barometric Pressure (" Hg)												
Ambient Temperature (°F)												
Pump Vacuum (" Hg)												

Notes:

Revision Date: 01/13/2004

Three-Point Dry Gas Meter Calibration Form (Against Critical Orifice)

Console ID _____ Date: _____ Signature: _____

			Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B	
DGM Calibration	Critical Orifice	Identification Number							
		K Factor							
	Subject DGM	DGM Initial Reading (ft ³)							
		DGM Final Reading (ft ³)							
		Temperature (°F)	Inlet Initial						
			Outlet Initial						
			Inlet Final						
			Outlet Final						
	Test Time (minutes)								
	Orifice Manometer, ΔH (" H ₂ O)								
	Barometric Pressure (" Hg)								
	Ambient Temperature (°F)								
Pump Vacuum (" Hg)									
Temperature Readout Calibration	Check the readout against a NIST Thermometer			Check the readout linearity (one channel only)					
	NIST Thermometer ID _____			Voltage Supply ID _____		Channel No _____			
	Thermometer Reading (°F)		Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)			
	Readout Reading (°F)		0	32					
			1	77					
			3	165					
7			341						
		15	692						

Appendix A
NIST Special Publication 800-100-1
Revision 1.0

Revision Data: 01/13/2004

VOST Console DGM & Thermocouple Calibration Form

DGM Calibration	
Console ID	Operator Signature
Nominal Orifice Flow Rate	Date

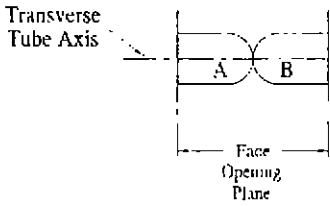
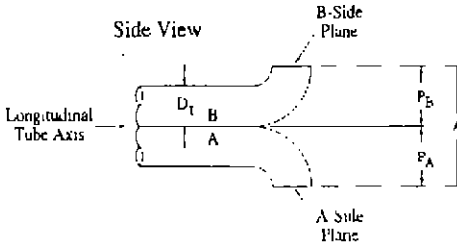
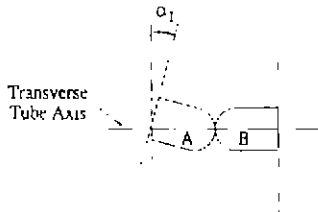
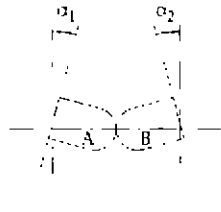
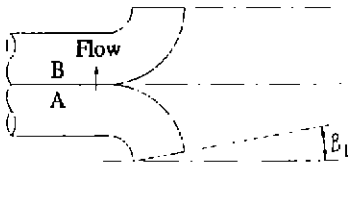
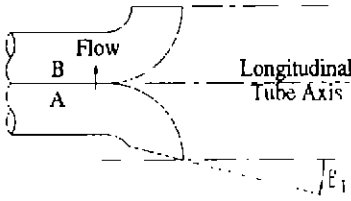
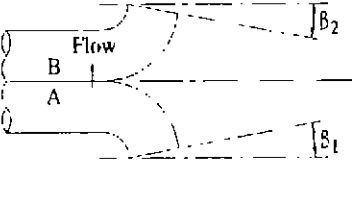
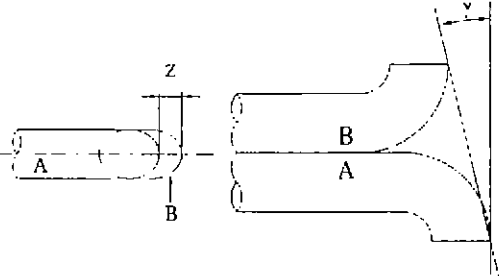
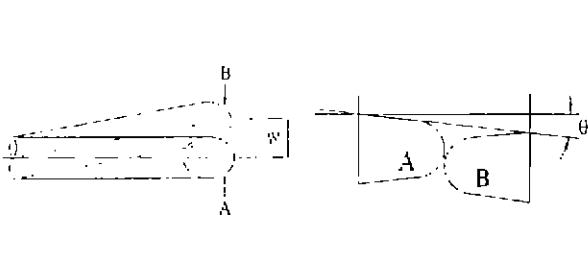
			Run 1	Run 2	Run 3
Orifice Information	ID Number				
	K Factor				
DGM being Calibrated	Vol (L)	Initial			
		Final			
	T _{meas} (°F)	Inlet Initial			
		Outlet Initial			
		Inlet Final			
		Outlet Final			
	Meter Pressure (" H ₂ O))				
Test Conditions	Pump Vacuum (" Hg)				
	P _{bar} (" Hg)				
	T _{ambient} (°F)				
	Test Duration (min)				

Thermocouple Calibration	
Thermometer ID	Voltage Supply ID

Temperature Readout Accuracy			Temperature Readout Linearity			
Thermometer Reading (°F)	Temperature Readout		Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
	Channel No.	Temperature (°F)				
				0	32	
				1	77	
				3	165	
				7	341	
				15	692	

S-Type Pitot Tube Inspection Sheet

Inspector: _____ Date: _____ Pitot ID: _____

<p>General Pitot Tube Alignment</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>End View</p>  </div> <div style="text-align: center;"> <p>Side View</p>  </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div> <p>A = _____</p> <p>D_t = _____</p> </div> <div> <p>0.188" ≤ D_t ≤ 0.375"? _____ (y/n)</p> <p>1.05 ≤ $\frac{A}{2D_t}$ ≤ 1.50? _____ (y/n)</p> </div> </div>		
<p>Misalignment</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div> <p>α₁ = _____</p> <p>α₂ = _____</p> </div> <div> <p>α₁ ≤ 10°? _____ (y/n)</p> <p>α₂ ≤ 10°? _____ (y/n)</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;">    </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div> <p>β₁ = _____</p> <p>β₂ = _____</p> </div> <div> <p>β₁ ≤ 5"? _____ (y/n)</p> <p>β₂ ≤ 5"? _____ (y/n)</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;">   </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div> <p>γ = _____ Z = A tan(γ) = _____</p> <p>θ = _____ W = A tan(θ) = _____</p> </div> <div> <p>Z ≤ 0.125"? _____ (y/n)</p> <p>W ≤ 0.031"? _____ (y/n)</p> </div> </div>		
<p>Acceptability for Use (Circle Selection)</p>	<p>If all answers are "y", this pitot tube is available for use, and could be assigned a correction factor of 0.84</p>	<p>If all answers except the first (D_t) are "y", this pitot tube is available for use, but needs to be calibrated using a wind tunnel</p>	<p>Any other situation, the pitot tube must be removed from service.</p>

Pitot Tube Calibration Data Sheet

Pitot Tube Identification Number: _____ Date: _____

Calibrated by: _____

Run No.	"A" Side Calibration			Deviation $C_{p(s)} - \text{Avg } C_p$
	ΔP_{std} (in. water)	ΔP_s (in. water)	$C_{p(s)}$	
1				
2				
3				
Average $C_{p(s)}$ (Side A)				

Run No.	"B" Side Calibration			Deviation $C_{p(s)} - \text{Avg } C_p$
	ΔP_{std} (in. water)	ΔP_s (in. water)	$C_{p(s)}$	
1				
2				
3				
Average $C_{p(s)}$ (Side B)				

$$C_{p(s)} = C_{p(std)} \times \sqrt{\frac{\Delta P_{std}}{\Delta P_s}} \quad C_{p(std)} = 0.99$$

$$\text{Average Deviation} = \sigma_{(a \text{ or } b)} = \sum_{i=1}^3 \left(\frac{C_{p(s)} - C_{p(s)i}}{3} \right) \quad \text{Must be } \leq 0.01$$

$$\text{Difference} = \left| \text{Average } C_{p(s)a} - \text{Average } C_{p(s)b} \right| \quad \text{Must be } \leq 0.01$$

Portable Barometer Calibration Data Sheet

Portable Barometer Identification _____

Date _____

Operator _____

Laboratory barometer reading (reference) (in Hg)	
Portable barometer reading after correction (in Hg)	
Difference between reference and portable after correction (in Hg)	
Is the difference $\leq \pm 0.1$ in Hg (yes/no)	

BALANCE CALIBRATION

Balance ID _____ Date _____

Initial Calibration	Calibration Weight		Operator
	ID #	Mass	

Linearity Check	Calibration Weight		Balance Reading	Acceptable Range
	ID #	Mass		
		100		99.9 - 100.1
		200		199.8 - 200.2
		500		499.5 - 500.5
		1000		999 - 1001

<div style="text-align: center;">Calibration of Student Weights</div> <div style="text-align: center;">Student Weight Set ID _____</div>	Calibration Weight	Balance Reading

FIELD BALANCE CALIBRATION

Balance ID _____ Date _____

Operator _____

Calibration Check of Balance Using Student Weights Student Weight Set ID _____	Student Calibration Weight^a	Actual Mass (from Annual Calibration)	Balance Reading	Difference	Percent Difference^b

^a Use only calibration weights greater than 20 g.

^b The acceptance criteria for percent difference is $\pm 0.5\%$. This is calculated using this equation:

$$\text{Percent Difference} = \frac{\text{balance reading} - \text{actual mass}}{\text{actual mass}} \times 100$$

Sensitivity Check^c

Primary Weight (1000 g Class 1 Calibration Weight)	Balance Reading A	Secondary Weight (1 g Class 1 Calibration Weight)	Balance Reading B	Balance Reading of Secondary Weight (Balance Reading B – Balance Reading A)	% of Secondary Weight^d

^c In order to complete the sensitivity check of the field balance a weight greater than or equal to 1000 g is placed on the balance and the balance reading is recorded. Then a second weight less than or equal to 1 g is also placed on the balance. This second balance reading is recorded

^d The acceptance criteria for the sensitivity check is 85-115% of the secondary weight. This is calculated using this equation:

$$\% \text{ of Secondary Weight} = \frac{\text{Balance reading B} - \text{Balance Reading A}}{\text{Secondary Weight}} \times 100$$

URS CEMS Operation Log

Project	Page	of
Project Number	Operator	
Source	Date	

[illegible]

Project	Page of
Project Number	Operator
Source	Date

Calibration Gases

Component(s)	Concentration(s)	Cylinder ID

Indicate multi-component standards appropriately

Instrument Identification

Analyte	Manufacturer	Model Number	Serial Number

Method Performance Checks

Activity	Method	Criterion	Okay (initials)
Span Selection	6C, 7E, 3A	Emission limit >30% of span	
		Emission level always below 100% of span	
	25A	Span 1.5-2.5 times the emission limit	
		If no emission limit, span 1.5-2.5 times expected level	
Calibration Gas Selection	6C, 7E, 3A	Protocol gas, 40-60% and 80-100% of span	
		Zero grade nitrogen	
	25A	Protocol gas: 25-35%, 45-55% and 80/90% of span	
		Zero grade Air	
Calibration Error	6C, 7E, 3A	Span gas within $\pm 2\%$ of span	
		Mid-range gas within $\pm 2\%$ of span	
		Zero gas within $\pm 2\%$ of span	
	25A	Low-range gas within 5% of certified value	
		Mid-range gas within 5% of certified value	
System Bias Check	6C, 7E, 3A	Selected gas within $\pm 5\%$ reading during calibration error	
	25A	Not Applicable	
Post-Test Calibration Drift Check	6C, 7E, 3A	Selected gas reading within $\pm 3\%$ of span of previous reading	
		Zero gas within $\pm 3\%$ of span of previous reading	
	25A	Selected gas reading within $\pm 3\%$ of span of previous reading	
		Zero gas within $\pm 3\%$ of span of previous reading	

Hourly Drift Check (M25A only)

	Okay (initials)					
	Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6
Selected gas reading within $\pm 3\%$ of span of previous reading						
Zero gas within $\pm 3\%$ of span of previous reading						

SURROGATE TRIAL BURN PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX A

ANNEX C

RESUMES OF KEY INDIVIDUALS

REVISION 0

January 4, 2010

TABLE OF CONTENTS

URS CORPORATION KEY PERSONNEL RESUMES.....	C-1
TESTAMERICA KEY PERSONNEL RESUMES	C-8
AIR TOXICS, LTD., KEY PERSONNEL RESUMES	C-11

URS CORPORATION KEY PERSONNEL RESUMES

Michael Fuchs

Eugene Youngerman, PhD

D. Chris Weber

Margaret Jephson

Adam Blank

Kevin McGinn

George Lipinski, PE

Walter Lin

Carl Galloway

Steven Hall

Robert Woytek

Blake Yarbrough

David Maxwell

G. Jose Arellano

Derek Ballek

Nathan Reichardt

Thomas Brado

Andrew Hodgson

Vaughn Kashuba

URS CORPORATION KEY PERSONNEL RESUMES

MICHAEL FUCHS

Project Manager

Mr. Michael Fuchs is a Project Manager in the Measurements Group in the URS Austin, Texas, office. Mr. Fuchs began his career performing source testing and has now managed projects while continuing to provide hands-on participation. Mr. Fuchs primarily manages projects related to the treatment of hazardous waste (primarily combustion); emissions measurements including source testing; and regulatory compliance (RCRA, TSCA, and HWC MACT) for hazardous waste combustion facilities. He actively participates in those projects by preparing test plans and QAPPs; supervising trial burns and related projects; and preparing reports and regulatory filings. Mr. Fuchs manages the trial burns and related projects at TOCDF as well as managing similar projects for industrial clients. He has a Bachelor's degree in Chemistry from Southwest Texas State University at San Marcos.

EUGENE YOUNGERMAN, Ph.D.

Senior Project Chemist, Quality Officer

Dr. Eugene Youngerman has worked on trial burns and incinerator performance tests since 1987. Roles have included field lead, process sampler, project manager, QA/QC coordinator, and laboratory coordinator. He has experience in permitting and testing activities of hazardous waste incinerators, as well as other source testing directed toward process characterization or regulatory compliance. He has over nine years experience in this area including document preparation; test protocol design and preparation; plan implementation; and interpretation and reporting of sampling, analysis, and QA/QC results. He has served as Project Director on major sampling and analysis programs for RCRA and TSCA pre-trial burn tests and trial burns. Dr. Youngerman has several publications relating to his experience on various projects and holds a Bachelor's degree in Chemistry from the Massachusetts Institute of Technology at Cambridge; and a Master's and Doctorate in Chemistry, both from the University of California at San Diego.

D. CHRISTOPHER WEBER

Scientist

Mr. D. Christopher Weber is a Scientist in the Measurements Group in the URS Austin, Texas, office. His primary focus is on projects dealing with emissions measurement in the chemical demilitarization, power, petrochemical, semiconductor, pharmaceutical, cement, and various manufacturing industries. He has gained experience with combustion, petrochemical, and other industrial processes through participation in numerous efforts designed to permit and characterize processes or pollution control devices. Mr. Weber has a Bachelor's degree in Biology, from Vanderbilt University at Nashville, Tennessee.

MARGARET JEPHSON

Scientist

Ms. Margaret Jephson is a Scientist in the Measurements Group for the URS Austin, Texas, office. She has worked for the Measurements Group since 2000, and her areas of expertise include air regulatory compliance support and trial burn testing and reporting. Her role in various projects is primarily that of Field Team Lead, leading the field aspect of emissions testing projects and working with clients to help them fulfill their compliance needs. Ms. Jephson has worked as a Field Team Lead for VX and mustard agent trial burns at TOCDF. In addition, she has also been responsible for preparing test plans, compiling test results, and preparing formal reports for submittal to regulatory agencies. Ms. Jephson holds a Bachelor of Science in Chemistry from Southwestern University at Georgetown, Texas.

ADAM BLANK

Scientist

Mr. Adam Blank primarily focuses on technical and measurement support of projects characterizing emissions from combustion sources. Over his career at URS, Mr. Blank has participated in a number of projects supporting HWC MACT and RCRA trial burns. He has worked with multiple hazardous waste combustion units and clients, including commercial and process units, and a chemical weapons demilitarization facility. He has experience with test design, project planning and execution, and test reporting in numerous efforts designed to permit and characterize emissions from processes or pollution control devices. Mr. Blank holds a Bachelor's degree in Bio-Psychology from Tufts University at Boston, Massachusetts.

KEVIN MCGINN

Senior Scientist

Mr. Kevin McGinn has 14 years experience in the field of air quality, specializing in emissions measurement. As a Senior Scientist, he has supervised field teams, written test reports, and performed quality assurance duties for projects in the waste incineration and petrochemical industries. As a Program Manager, he has managed projects in the chemical demilitarization, waste incineration, cement production, and chemical industries. Mr. McGinn holds a Bachelor's degree in Chemistry from McGill University at Montreal, Quebec, Canada.

GEORGE LIPINSKI, Professional Engineer (PE)

Senior Project Manager

Mr. George Lipinski is a chemical engineer with 24 years of experience in environmental engineering. As a consultant, he has managed projects in the waste management, chemical, pharmaceutical, electric utility, and independent power-production industries. His experience includes a variety of environmental programs in air quality, hazardous waste, solid waste, and water quality. Mr. Lipinski has specialized experience in the fields of air quality, combustion, incineration, and waste management. In addition, he has authored a number of papers and

presentations related to hazardous waste and wood fuel combustion. Mr. Lipinski is a registered PE and holds a Bachelor's in Chemical Engineering from the University of Texas at Austin.

WALTER LIN

Senior Scientist

Mr. Walter Lin develops and manages trial burn and performance test programs for thermal treatment systems including incinerators, Boiler and Industrial Furnace (BIF) units, and non-traditional thermal treatment processes. In addition, Mr. Lin prepares trial burn plans to provide Comprehensive Performance Testing that demonstrates compliance with applicable regulations and gathers data for site-specific risk assessments. He holds a Bachelor's in Chemistry from University of North Carolina at Wilmington.

CARL GALLOWAY

Senior Sampling Technician

Mr. Galloway has participated in trial burn sampling activities since 1989, performing isokinetic sampling, VOST (0030 and 0031) CEMS operation, train preparation, process sampling, gas chromatography (M18 and 0040), and sample shipping. He has experience with sampling and analysis of FGD and SCR systems, including nitrogen oxides (M7D), sulfur dioxide and sulfuric acid (M6, NCASI 8A), ammonia (CTM 027, and other variants), plus other related process measurements, including reduced sulfur species (M11, M15, M16). Mr. Galloway holds a Bachelor's in Biology from the University of Texas at Austin.

STEVEN HALL

Senior Scientist

Mr. Steven Hall has over 14 years of experience conducting emission measurements at a myriad of sources. As a Senior Scientist, he has supervised field teams, written test reports and plans, and performed quality assurance duties for projects in the power, oil and gas, semiconductor, cement, and petrochemical industries. Mr. Hall specializes in the field of air quality measurements by Fourier Transform Infrared Spectroscopy (FTIR). He holds a Bachelor's in Chemistry from the University of Illinois.

ROBERT WOYTEK**Technician/Laboratory Manager**

Mr. Robert Woytek has been involved in numerous trial burn efforts throughout his 18-year career with URS. His experience ranges from isokinetic train preparation and recovery to isokinetic train sample collection. Mr. Woytek is also responsible for maintenance, calibration, and inspection of the URS sampling equipment and NIST Traceable calibration equipment. He studied Biology at Austin Community College at Austin, Texas.

BLAKE YARBROUGH**Scientist**

Mr. Blake Yarbrough is a Project Chemist primarily focusing on technical and measurement support of projects dealing with characterizing emissions from combustion sources. In almost two years at URS, Mr. Yarbrough has participated in a number of projects supporting HWC MACT and RCRA trial burns. He has worked with multiple hazardous waste combustion units and clients, including commercial and process units, and a chemical weapons demilitarization facility. He has experience with project planning, execution, and reporting designed to permit and characterize emissions from processes or pollution control devices. Mr. Yarbrough holds a Bachelor's in Chemistry from Texas A&M University at College Station.

DAVE MAXWELL**Senior Scientist**

Mr. David Maxwell is an analytical chemist with 25 years experience in the characterization of chemical and industrial processes, and the management of source emissions testing, ambient air monitoring, and environmental analysis programs. His project experience specialty is the testing of existing, and development of new, fossil fuel technologies; the development and application of chemical measurement methods; and the analysis of gasification process streams and emissions from hazardous waste incineration and other combustion systems. Mr. Maxwell is recognized for possessing a fundamentally strong analytical chemistry background and the following professional skills

- Management and technical direction of industrial and environmental sampling and analytical projects, including sample collection and recovery;
- Development of sampling and analytical solutions to complex industrial process and environmental applications;
- Preparation of written project and quality assurance plans, project reports, technical papers and presentations; and
- Evaluation and interpretation of analytical results and quality control data.

In addition, Mr. Maxwell holds a Bachelor's degree in Chemistry from the University of Southern California at Los Angeles.

GERMAN JOSÉ ARELLANO**Analytical Chemist**

Mr. German Jose Arellano is a Master's-level analytical chemist possessing a strong background in laboratory and field sampling operations with over five years of experience in the chemical industry and knowledge of various U.S. EPA environmental protocols. He commands a comprehensive knowledge of chemical and scientific processes with an emphasis in mass spectrometry and FT-IR, as well as other spectroscopic and chromatographic techniques. Mr. Arellano has a Bachelor's degree in Chemistry from the University of Texas at Austin and a Master's degree in Analytical Chemistry from the University of Wisconsin at Madison.

DEREK BALLEK**Scientist**

Mr. Derek Ballek gained trial burn sampling experience at the TOCDF during MPF and LIC agent trial burns in January 2007. As part of the sampling team, Mr. Ballek ran various sampling trains and aided in sample recovery. In addition to these trial burns, Mr. Ballek has provided sampling during several mini-burns. He holds a Bachelor's degree in Chemistry from the University of Texas at Austin.

NATHAN REICHARDT**Environmental Scientist**

Mr. Nathan Reichardt is an Environmental Scientist in the URS Austin, Texas, office. He specializes in the fields of ambient air monitoring, simultaneous TO-15 sampling (three canisters), data management, and odor control. He is experienced in using U.S. EPA Method 17, simultaneous method 26 (two trains), and Ontario Hydro sampling (two trains). Mr. Reichardt holds a Bachelor's degree in Environmental Science from West Texas A&M University at Canyon.

THOMAS BRADO**Field Technician**

Mr. Thomas Brado has a variety of experience performing source and ambient monitoring on private, commercial, and government facilities. His testing experience has involved a variety of simple to complex systems, each with their own challenges. Testing at government installations has included the Naval Air Warfare Center China Lake, United States Army Dugway Proving Grounds, and trial burns at Tooele Chemical Agent Disposal Facility. Mr. Brado holds a Bachelor's degree in Justice from the University of Alaska at Fairbanks.

ANDREW HODGSON**Project Scientist**

Mr. Andrew Hodgson is a Project Scientist in the URS Measurements Group. In addition to his extensive experience in ambient air monitoring, he has performed isokinetic stack emissions sampling per U.S. EPA methods on various projects, and he has assisted on trial burns at the TOCDF facility. Mr. Hodgson holds a Bachelor's degree in Environmental Science from Lehigh University at Bethlehem, Pennsylvania.

VAUGHN KASHUBA**Field Technician**

Mr. Vaughn Kashuba has three years experience in emissions measurement. As a field technician, he has supervised testing locations, written test reports, and performed quality assurance duties for sampling data. He holds a Bachelor's degree in History and Sociology from the University of North Carolina at Greensboro.

TESTAMERICA KEY PERSONNEL RESUMES

Robert Hrabak

Karla S. Buechler

Douglas Weir

Steven D. Rogers

David Allameh

Robert Weidenfeld

TESTAMERICA KEY PERSONNEL RESUMES

ROBERT HRABAK

Operations Manager

Mr. Robert Hrabak has over 20 years experience in the environmental industry with over 16 years in various managerial positions. He is responsible for monitoring workflow, increasing efficiency and productivity of all operational groups in the laboratory. He assures completion and follow-through on day-to-day operations in all departments. These day-to-day operational responsibilities include client satisfaction, financial management, human resources, health and safety program compliance, and quality assurance plan compliance. Mr. Hrabak has specialized in the area of the Advanced Technology Group, focusing on dioxins and specialty chemicals. His extensive technical knowledge in these areas and excellent organizational skills made him the ideal choice to manage these projects in the laboratory. Mr. Hrabak holds a Bachelor's degree in Biological Sciences from the University of California at Davis.

KARLA S. BUECHLER

Laboratory Manager

Ms. Karla Buechler has over 20 years experience in the environmental industry with over 13 years in various managerial positions. In addition, she has eight years of hands-on experience with pesticide extraction and GC. In her current role she oversees the overall operation of the West Sacramento Laboratory. Ms. Buechler holds a Bachelor's degree in Biochemistry from the University of California at Davis.

DOUGLAS WEIR

Quality Assurance Manager

Dr. Douglas Weir directs and monitors quality assurance activities at the West Sacramento facility. He is responsible for reports to management, client concerns, project plan review, lab performance review, and review of procedures that will ensure the production of data of a defined quality. He is responsible for performing the systems and method audits of the laboratory. He has over 19 years experience in the environmental laboratory industry, which includes experience in high and low resolution GC/MS, GC/ECD, HPLC, UV/visible spectroscopy, and magnetic resonance. He has authored method standard operating procedures, Quality Assurance Plans, project cost proposals, and 30 scientific papers. He is conversant with a wide variety of U.S. EPA methodologies including SW846 organic and inorganic methods; series 500 and 600 methods for drinking water and wastewater; methods 1613B, 1614, 1668A, 1625, 1656, 8290, and 8280A. Dr. Weir has a Bachelor's degree in Chemistry and a Doctorate in Physical Chemistry, both from Queen's University at Kingston, Ontario, Canada.

STEVEN D. ROGERS**Volatile Organics Analysis Department Manager**

Mr. Steven Rogers has over 22 years of management and bench level experience. He is currently managing the Volatile Organics Analysis department. He provides technical expertise in all organics areas of the lab. Mr. Rogers holds a Bachelor's in Biochemistry/Biophysics from Oregon State University at Corvallis.

DAVID ALLAMEH**GC/HPLC/LCMS Department Manager**

Mr. David Allameh has over 19 years of experience in environmental analyses. He is responsible for the groups performing petroleum hydrocarbon methods and HPLC methods 8310 and 8330. He coordinates instrument maintenance, data review, analyst training, updating of SOPs as well as scheduling sample analysis. He held technical and supervisory positions at environmental testing laboratories prior to joining TestAmerica. He applies his experience to both government and commercial customers, providing them with high quality data meeting the specified data quality objectives. Mr. Allameh holds a Bachelor's in Engineering from United States International University at San Diego.

ROBERT WEIDENFELD**Project Manager, Trial Burn Coordinator**

Mr. Robert Weidenfeld brings over 20 years experience to the project manager position, specializing in both source and ambient air monitoring programs. In this role, he functions as the interface between the client and the laboratory ensuring that QAPP and sampling programs plans are properly implemented. In addition, Mr. Weidenfeld is the primary laboratory project manager for the Army Chemical Demilitarization program, managing and coordinating work from Tooele, Umatilla, Pine Bluff, and Anniston. Mr. Weidenfeld holds a Bachelor's degree in Agricultural Management from the University of California at Berkeley.

AIR TOXICS, LTD., KEY PERSONNEL RESUMES

Linda L. Freeman
Brad Mosakowski
Heidi C. Hayes
Melanie Levesque
Nathan Shafer
Ken Zeleny
Jeffrey Tecson
Jeet Grewal
Timothy Sanfelice
Brandon Dunmore
Ausha Scott

AIR TOXICS, LTD., KEY PERSONNEL RESUMES

LINDA L. FREEMAN

Chief Executive Officer and Laboratory (Technical) Director

Ms. Linda L. Freeman is the Technical Director and the Chief Executive Officer of Air Toxics, Ltd., providing leadership to ensure that the founding mission and core values of the company are put into practice. Ms. Freeman has over 20 years of combined environmental experience and 18 years of laboratory business management experience. She leads programs relating to the development of long-range strategy, quality systems, and financial infrastructure. As Technical Director (1), her responsibilities include: the administrative review of laboratory operations and qualifications for the technical positions, ensuring and documenting initial and ongoing proficiency, and overseeing quality systems. Ms. Freeman holds a Bachelor's degree from Boston College at Boston, Massachusetts, and a Master's degree in Chemistry from the University of Wisconsin at Madison.

BRAD MOSAKOWSKI

President

Mr. Mosakowski is the President of Air Toxics, Ltd., and represents the partnership in all matters. Mr. Mosakowski provides day-to-day leadership and management of programs for overseeing the processes and resources necessary to establish long-range service objectives, plans, and policies, in cooperation with the Chief Executive Officer and Board of Managers. He is responsible for the measurement and effectiveness of both internal and external processes by providing accurate and timely feedback on the operating condition of the company. In addition, Mr. Mosakowski directs the definition and operation of laboratory production by fostering a success-oriented and accountable environment within the company. A critical component of his skill is the ability to motivate and lead a high-performance management team capable of meeting both customer service and bottom line financial objectives. Mr. Mosakowski has over 15 years of combined environmental laboratory experience.

HEIDI C. HAYES

Vice President, Director of Business Development, and Technical Director

Ms. Heidi C. Hayes is the Vice President, Director of Business Development, and Technical Director (2) of Air Toxics, Ltd. Ms. Hayes is responsible for developing sustainable customer relations by providing customized solutions through technical leadership in marketing, sales, and service. She is the key technical interface between laboratory services and major clients. Ms. Hayes plans, develops, and establishes policies and objectives for developing a more technical marketing, sales, and service organization. She accomplishes this by providing the technical *leadership, management, and vision necessary to ensure that the company has the proper* operational controls, administrative procedures, and human resource management in place to

meet customer needs and quality objectives. Ms. Hayes holds a Bachelor's degree in Chemistry and Mathematics from Luther College and a Master's degree in Chemistry from the Colorado School of Mines at Golden.

MELANIE LEVESQUE

Quality Assurance Manager

Ms. Melanie Levesque has ten years of laboratory experience and has worked in a variety of positions including HPLC Chemist, GC/MS Chemist, and Laboratory Supervisor. She develops and supervises programs intended to ensure that the laboratory is producing data of known and acceptable quality. Ms. Levesque oversees Quality Control (QC) activities including various independent checks of laboratory systems, generating Standard Operating Procedures (SOPs) and corrective action procedures, and monitoring laboratory certification programs. Ms. Levesque has documented training in the approved methods and can verify that the laboratory is following SOPs. In addition, Ms. Levesque maintains independence from the operations by not engaging in production activities and reporting directly to the President. The Quality Assurance (QA) Department conducts a yearly independent audit of the quality systems and methods criteria, and notifies laboratory directors of deficiencies via a written report. Ms. Levesque holds a Bachelor's degree in Chemistry and a Master's degree in Analytical Chemistry, both from the Rochester Institute of Technology at Rochester, New York.

NATHAN SHAFER

Laboratory Department Head

Mr. Nathan Shafer is the Department Manager for the Volatile Organic Compound (VOC) GC/MS analysis group. This department is responsible for all analyses via methods TO-14A-15, VOST methods 0030 and 0031, TO-17, and all VOC pptv work in the area of vapor intrusion. Mr. Shafer is responsible for managing and overseeing all processes and resources involved in the daily operations of the VOC department. In addition, he provides technical support to client services, sales, and the department; he is also responsible for coaching and training team members, data review, scheduling, and conferencing. Mr. Shafer has been employed by Air Toxics, Ltd., since 1997, and he has 10 years of environmental laboratory experience. His experience comes from roles such as GC/MS chemist, Laboratory Supervisor, and Project Development Chemist. Mr. Shafer holds a dual degree in Chemistry and Psychology from Claremont McKenna College in Claremont, California.

KEN ZELENY**Information Technology Manager**

Mr. Zeleny is the Information Technology Manager for the IT Group. His responsibilities include database management, software development, and network management. Mr. Zeleny has over 18 years experience with computer and technology functions in both large and small organizations. His experience also includes five years as a Senior Systems Architect and then as a manager of the Development Team. Prior to this, Mr. Zeleny worked as a Senior NT Systems Engineer, IT Supervisor, Network Administrator, and Senior Technical Support Analyst. Mr. Zeleny has been employed at Air Toxics, Ltd., since August 2005.

JEFFREY TEESON**Support Services Team Leader**

Mr. Jeffrey Teeson is the Team Leader for the Support Services Team. This team is responsible for cleaning and coordinating the certification of Summa, Silco, and Silonite Canisters. Other responsibilities include preparation of flow controllers, TO-17 tubes, and VOST/SMVOC tubes for Methods 0030 and 0031. Mr. Teeson has 11 years of management experience and five years experience in bench work for Support Services; currently Mr. Teeson is spending 25 % of his time on the bench. Mr. Teeson has an A.S. in Computer Technology from Heald College at Rancho Cordova, California.

JEET GREWAL**Lead Scientist, VOST analysis**

Mr. Grewal has been the Lead Scientist in VOST and TO-17 analysis for the last 10 years at Air Toxics, Ltd., and he has extensive experience with VOST trial burn projects. His duties include routine VOST analysis and data write up, work scheduling, and implementation of project specific QA/QC requirements. Mr. Grewal is actively involved with staff training and teaching VOST training classes. He is very experienced with instrument maintenance, troubleshooting, solving analytical and technical problems, and method development involving VOST and TO-17 analysis. Prior to Air Toxics, Ltd., Mr. Grewal gained eight years of experience as a GC and GC/MS chemist, including four years as a group leader in an environmental laboratory. He holds a Master's degree in Organic Chemistry.

TIMOTHY SANFELICE**MS Interpretation Specialist**

Timothy Sanfelice is a Scientist on the GC/MS Volatiles team. He is responsible for the operation, calibration, and maintenance of the GC/MS quadrupole systems. In addition to analyzing environmental air samples and standards for VOCs, he reduces the data acquired from these analytical mainframes. Mr. Sanfelice takes a lead role in trouble-shooting and solving any hardware/instrument problems that arise. In addition, he participates in method development projects and evaluations. Mr. Sanfelice has worked in several Senior Chemist positions, where his responsibilities included method development, equipment maintenance and repair, data review, and report generation. He has over 18 years experience in the environmental laboratory.

field. Mr. Sanfelice holds a Bachelor's degree in Chemistry with a minor in Biology from California State University at Sacramento.

BRANDON DUNMORE

Project Manager

Brandon Dunmore has been a Project Manager at Air Toxics, Ltd., since May 2006 and is responsible for the Central Region. In this position, he serves as a liaison between the client and the laboratory, coordinating project setup and monitoring the progress of samples through analysis and reporting. Mr. Dunmore provides technical support to clients and maintains account information in the Client Services database. Mr. Dunmore has ongoing in-house training to keep current on air methods for sampling and analysis, as well as specific laboratory processes. Prior to working in Client Services, Brandon spent over five years as a laboratory analyst. Mr. Dunmore holds a Bachelor's degree in Molecular Biology and Clinical Laboratory Technology from California State University at Sacramento.

AUSHA SCOTT

Client Services/Receiving Team Leader

Ms. Ausha Scott is the Team Leader for the Client Services and Login/Receiving Departments. She is responsible for overseeing the project management functions, including client relations and technical support. In addition, she directs the daily activities of the Login/Receiving team. Ms. Scott has six years of environmental laboratory experience in a variety of positions including GC/MS chemist and client service representative. Ms. Scott holds a Bachelor's degree in Marine Biology from University of California at Santa Cruz.

SURROGATE TRIAL BURN PLAN

FOR THE

AREA 10 LIQUID INCINERATOR

APPENDIX B

ATLIC SHAKEDOWN PLAN

REVISION 0

January 4, 2010

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PREPARATORY ACTIVITIES.....	3
3.0	GENERAL SHAKEDOWN ACTIVITIES	4
4.0	LIC SHAKEDOWN ACTIVITIES.....	5
5.0	POST-ATLIC STB ACTIVITIES	7

1.0 INTRODUCTION

The Tooele Chemical Agent Disposal Facility (TOCDF) was designed and built as a hazardous waste disposal facility for the U.S. Army. The TOCDF is designed to dispose of chemical Agents GB, VX, and Mustard (H-series), drained munitions, contaminated refuse, bulk containers, liquid wastes, explosive, and propellant components, which are all a part of the chemical agent stockpile at the Deseret Chemical Depot (DCD). The DCD is located 20 miles south of Tooele, Utah. EG&G Defense Materials, Inc. (EG&G), operates the TOCDF under contract to the U.S. Army through the Chemical Materials Agency (CMA).

The TOCDF consists of five different Hazardous Waste Incinerators that are currently processing the DCD mustard stockpile. The TOCDF incinerator will complete processing the DCD mustard stockpile in mid to late 2011.

EG&G also will operate the Area 10 Liquid Incinerator (ATLIC), which is located within the DCD chemical munition storage area that is adjacent to the TOCDF. The ATLIC is being designed and constructed to process the 4 ton containers (TCs) of Agent GA, the 10 TCs of Lewisite, and up to 10 TCs referred to as "Transparency" TCs, some of which previously contained Lewisite.

The ATLIC Shakedown will begin after approvals for the Surrogate Trial Burn (STB) and Lewisite Comprehensive Performance Test are received from the State of Utah, Department of Environmental Quality (DEQ), Division of Solid and Hazardous Waste (DSHW) and Division of Air Quality (DAQ). The wastes that will be processed during the shakedown period are a surrogate mixture of chlorobenzene and tetrachloroethene (with metals spikes) and simulated spent decontamination solution (spent decon) comprised of 2 % percent sodium hydroxide and 10 % sodium chloride to simulate the ash loading from burning Agent GA.

The ATLIC includes a primary combustion chamber (PCC) followed by a secondary combustion chamber (SCC). Exhaust gas from the SCC is routed to the Pollution Abatement System (PAS), which consists of a quench tower, followed by a series of low-energy packed bed scrubbers. The scrubbers are followed by a high-energy venturi scrubber, moisture separator, exhaust gas re-heater, baghouse, fixed-bed carbon filter, and finally, an induced draft (ID) fan.

The initial ATLIC Shakedown operations will be processing the surrogate mixture. The objectives of the ATLIC Surrogate Trial Burn (STB) Shakedown are to:

- Demonstrate that the ATLIC can successfully and efficiently destroy the surrogate mixture at the proposed permitted feed rates.

- Familiarize the operators with the actions and process steps necessary to process Agent GA through handling and processing a less toxic substance (i.e., the surrogate mixture).
- Evaluate the ATLIC operating conditions relative to regulated ATLIC Operating Parameter Limits (OPLs) and waste feed rates.
- Evaluate the impact on the SCC of simultaneously processing a highly-chlorinated surrogate mixture and spent decon.

2.0

PREPARATORY ACTIVITIES

The ATLIC will only process Agent GA, Lewisite, and Transparency TCs. There are 4 GA TCs, 10 Lewisite TCs, and 10 Transparency TCs; the Transparency TCs are empty and do not contain any liquids or solids; however, they may have once contained Lewisite. In addition, the duration of the ATLIC agent campaigns will be much shorter than the TOCDF agent campaigns.

The CMA requires that agent and munition-specific Operational Readiness Reviews (ORRs) be conducted prior to the start of actual operations. During an ORR, all related procedures are reviewed and tested; the operators execute the processing activities according to procedures as ORR team members observe their actions. Agent draining and transfer operations are simulated using ethylene glycol or water. The procedures are further reviewed to ensure that environmental regulatory requirements are incorporated into the procedures.

Issues arising during the ORR are required to be closed according to a timetable and prior to the start of hazardous waste operations.

Because Agent GA will be fed shortly after the completion of the STB (i.e., upon approval by the Executive Secretary of ATLIC STB preliminary data), and because the GA Campaign is so brief (about 5 days), the function and operation of the Agent GA and Lewisite agent monitoring system and associated procedures will be included in the same ORR. The ORR findings associated with the agent monitoring systems may not necessarily be closed prior to the start of hazardous waste operations with surrogate mixture feed. Any findings associated with a specific chemical agent will be closed prior to processing that agent.

3.0 GENERAL SHUTDOWN ACTIVITIES

The DSHW will be provided with two weeks notice before feeding the surrogate mixture. The surrogate mixture is intended to be processed in the same manner as planned for Agent GA. This will include adding the components of the mixture to a TC, and then mixing the contents by rotating the TC. The surrogate mixture will be fed from TCs placed in the ATLIC gloveboxes. This will familiarize operators with the Agent GA processing steps using less toxic chemicals than Agent GA.

The ATLIC STB Shutdown Period is estimated to last less than 720 hours; however, TOCDF requests 720 hours of shutdown in case additional time will be necessary to ensure operational readiness before the STB. An extension of 720 additional hours of operating time may be requested, if necessary, as allowed by the governing regulations and TOCDF RCRA Permit.

Additionally, TOCDF may request final modifications to the ATLIC STB Plan based on the shutdown operational experience. Changes to the test plan will be coordinated with DSHW.

Collection and analysis of samples during the shutdown period will follow the directions in the Waste Analysis Plan.

4.0 ATLIC SHAKEDOWN ACTIVITIES

Surrogate feed to the ATLIC Primary Combustion Chamber (PCC) will be incrementally ramped-up. At each feed increment, with each increment being a greater percentage of the approved STB Plan feed rate limit, the feed rate will be held for a sufficient period of time to evaluate the stability of each of the regulated operating parameter values. For each regulated operating parameter, if the process value does not exceed the associated OPL, the feed increment will be increased.

If OPLs are being approached relative to the magnitude of the waste feed rate, adjustments to the incineration process will be made and an evaluation of the affects of the adjustments made will be performed before the feed increment is increased again. The surrogate feed rate to the ATLIC will be increased in this manner until the maximum feed rate of 325 pounds/hour (lb/hr) is attained.

Although all the regulated operating parameters must be within the operational envelope created by the OPLs (i.e., Automatic Waste Feed Cutoff setpoints), for surrogate mixture feed, the pertinent regulated Operating Parameters are:

- PCC Exhaust Gas Temperature;
- Secondary Combustion Chamber (SCC) Exhaust Gas Temperature;
- Packed Bed Scrubber Solution pH;
- Venturi Scrubber Differential Pressure;
- Exhaust Gas Flow Rate;
- Exhaust Gas CO Concentration;
- Exhaust Gas O₂ Concentration

In addition to those listed above, during times when metals spikes or spiking solutions are fed with the surrogate mixture, the pertinent regulated OPLs are:

- Pre-Baghouse Exhaust Gas Temperature;
- Powdered Activated Carbon feed rate;
- *Baghouse Differential Pressure; and*
- Fixed Bed Carbon Filter Differential Pressure.

Once the maximum sustainable surrogate feed rate has been determined and demonstrated, the same procedure will be used to determine the maximum sustainable spent decon feed rate. Note that it is intended to simultaneously feed wastes (i.e., surrogate mixture or agents, and spent decon) to the PCC and SCC, respectively.

5.0

POST-ATLIC STB ACTIVITIES

Following completion of the ATLIC STB, any unused surrogate mixture remaining in TCs and any unused spent decon will be fed to the ATLIC PCC and SCC, respectively, at half the rate demonstrated during the STB. After the unused surrogate mixture and spent decon have been treated, waste feed to the ATLIC will be stopped. Feed to the ATLIC will resume upon approval of the ATLIC STB preliminary data package by the DSHW and DAQ. The waste feeds shall be Agent GA and GA-derived spent decon. The feed rates of each of the waste feeds shall be limited to half of the rate demonstrated during the ATLIC STB. The restricted feed limits will ensure that the emissions are below the Hazardous Waste Combustor Maximum Achievable Control Technology emission limits during Agent GA processing.

**TOOELE CHEMICAL AGENT DISPOSAL
FACILITY
(TOCDF)**

**SURROGATE TRIAL BURN PLAN
FOR THE
AREA 10 LIQUID INCINERATOR**

APPENDIX C

**MASS AND ENERGY BALANCES FOR ATLIC STB AND EXHAUST
GAS RESIDENCE TIME CALCULATIONS**

REVISION 0

January 4, 2010

LIST OF FIGURES

Figure C-1	ATLIC Incinerator Process Flow Diagram.....	C-1
Figure C-2	ATLIC Pollution Abatement System Process Flow Diagram	C-2

LIST OF TABLES

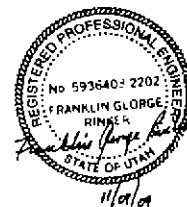
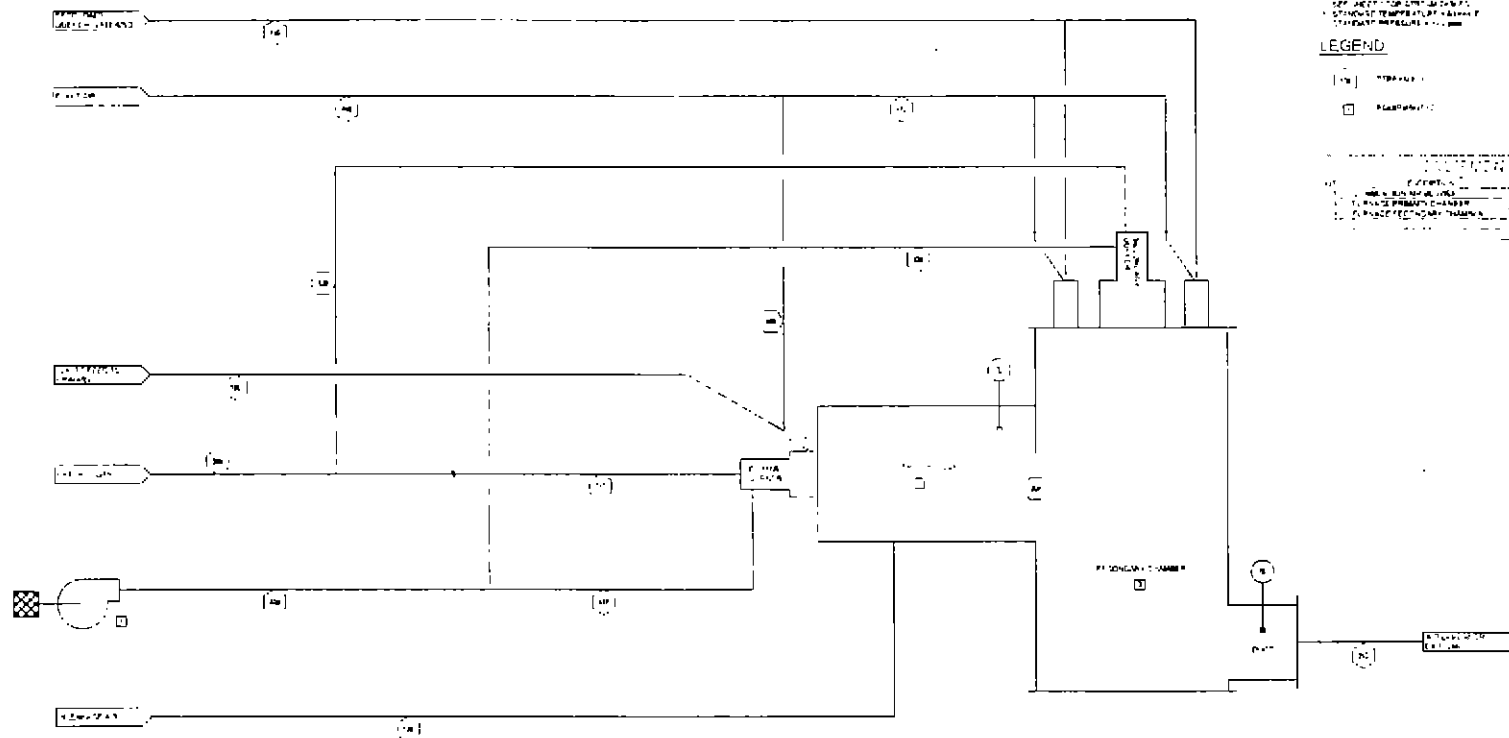
Table C-1	ATLIC STB Maximum Feed Mass and Energy Balances.....	C-3
Table C-2	ATLIC Exhaust Gas Residence Time Calculation for Surrogate Trial Burn Maximum Feed	C-5

REFERENCE DRAWINGS

NOTES:
 1. SEE DDC FOR LITIGATION
 2. SEE DDC FOR LITIGATION
 3. SEE DDC FOR LITIGATION

LEGEND

- 1. INTERFERENCE
- 2. PLUMBING



Geological Research
 and Engineering, LLC

EG&G
 11/01/09

STATION	10000
DATE	11/01/09
BY	FRANKLIN GEORGE RINICK
CHECKED BY	FRANKLIN GEORGE RINICK
APPROVED BY	FRANKLIN GEORGE RINICK
PROJECT	AREA 10 LIQUID INCINERATOR (ALIC)
DESCRIPTION	AREA 10 LIQUID INCINERATOR (ALIC)
DATE	11/01/09
BY	FRANKLIN GEORGE RINICK
CHECKED BY	FRANKLIN GEORGE RINICK
APPROVED BY	FRANKLIN GEORGE RINICK

REFERENCE DRAWINGS

NOTES

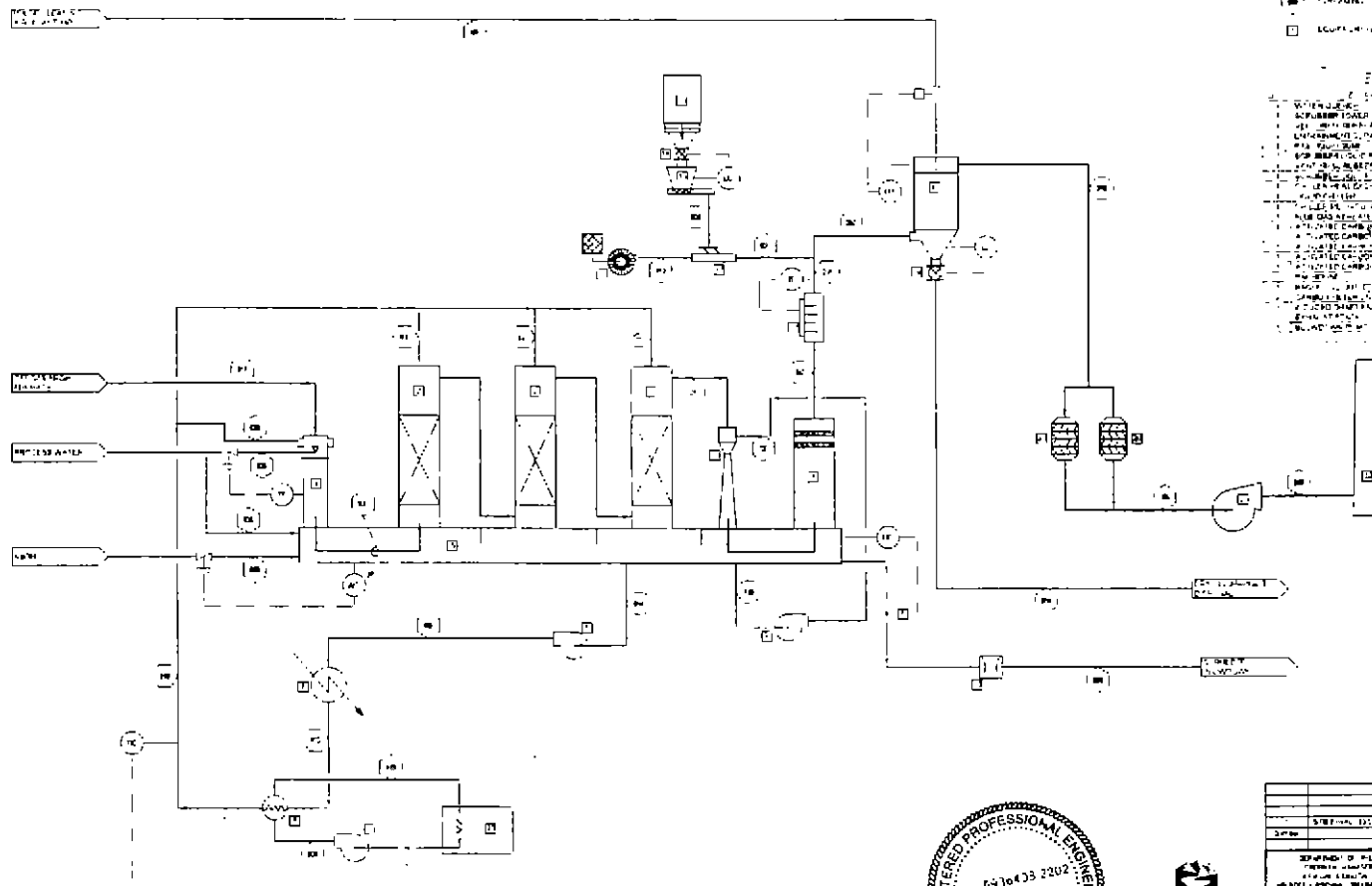
1. SEE DRAWING FOR DETAILS
2. SEE DRAWING FOR DETAILS
3. SEE DRAWING FOR DETAILS

LEGEND

- 1. SEE DRAWING FOR DETAILS
- 2. SEE DRAWING FOR DETAILS
- 3. SEE DRAWING FOR DETAILS

EQUIPMENT

ITEM	DESCRIPTION	QTY	REMARKS
1	WATER PUMP	1	
2	WATER PUMP	1	
3	WATER PUMP	1	
4	WATER PUMP	1	
5	WATER PUMP	1	
6	WATER PUMP	1	
7	WATER PUMP	1	
8	WATER PUMP	1	
9	WATER PUMP	1	
10	WATER PUMP	1	
11	WATER PUMP	1	
12	WATER PUMP	1	
13	WATER PUMP	1	
14	WATER PUMP	1	
15	WATER PUMP	1	
16	WATER PUMP	1	
17	WATER PUMP	1	
18	WATER PUMP	1	
19	WATER PUMP	1	
20	WATER PUMP	1	
21	WATER PUMP	1	
22	WATER PUMP	1	
23	WATER PUMP	1	
24	WATER PUMP	1	
25	WATER PUMP	1	
26	WATER PUMP	1	
27	WATER PUMP	1	
28	WATER PUMP	1	
29	WATER PUMP	1	
30	WATER PUMP	1	



Continental Research and Engineering, LLC
11/01/01

STATIONAL COLLECTION SYSTEM APPLICATION		DATE	APPROVED
DATE	REVISION	DATE	APPROVED
DEFINITION OF THE PROJECT PROJECT NAME: PAS SURROGATE TRIAL BURN PROCESS PROJECT LOCATION: AREA 10		PROJECT NUMBER: 61-22-F-823	
PROJECT DESCRIPTION PAS SURROGATE TRIAL BURN PROCESS FLOW DIAGRAM		PROJECT NUMBER: 61-22-F-823	
PROJECT NUMBER: 61-22-F-823		PROJECT NUMBER: 61-22-F-823	

REFERENCE DRAWINGS

NOTES

NOTES

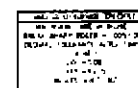
LEGEND

A

B

[illegible]

Continental Research

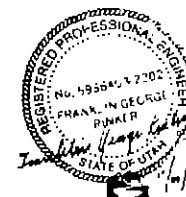
[illegible]

ITEM	DESCRIPTION	QTY	UNIT	PRICE	TOTAL	REMARKS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

REFERENCE DRAWINGS

NOTES

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.
 2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 3. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.



Consultant Research
and Engineering, LLC

EG&G
Environmental Research
and Engineering, LLC
1000 N. 1000 W.
Suite 100
Salt Lake City, UT 84119
Phone: (801) 466-1000
Fax: (801) 466-1001
E-mail: info@egandg.com
Web: www.egandg.com

Project No.	59584	Revision	1
Client	Utah Department of Environmental Quality	Project Name	Chemical Stockpile Disposal Program
Location	Area 10	Project Description	Area 10 Liquid Incinerator (ALIC) P&ID Subrogate Trial Burn Process Flow Diagram
Drawn by	Phyllis George Pinner	Checked by	Phyllis George Pinner
Date	1/4/2002	Scale	AS SHOWN
Project No.	59584	Revision	1
Client	Utah Department of Environmental Quality	Project Name	Chemical Stockpile Disposal Program
Location	Area 10	Project Description	Area 10 Liquid Incinerator (ALIC) P&ID Subrogate Trial Burn Process Flow Diagram
Drawn by	Phyllis George Pinner	Checked by	Phyllis George Pinner
Date	1/4/2002	Scale	AS SHOWN

TABLE C-2. ATLIC EXHAUST GAS RESIDENCE TIME CALCULATION for STB MAXIMUM FEED

Section Description	A	B	C $C = (B/2)^2 * 3.14159$	D $D = A * C$	E	F $F = D * 60 / E$
	Length ^a (ft)	Diameter ^a (ft)	X-Sectional Area (ft ²)	Section Volume (ft ³)	Gas Flow Rate ^b (ft ³ /min)	Residence Time (sec)
Primary Combustion Chamber (PCC) ^c	11.29	3.50	9.62	108.62	5.484	1.19
Secondary Combustion Chamber (SCC) ^d	15.88	3.92	12.07	191.59	5.928	1.94
Totals ⇒				300		3.13

a Dimensions are taken from LIC refractory installation drawings, which are available onsite for review.

b Exhaust gas flow rates from the Heat and Material Balance are found in Appendix C for the Maximum Operating Condition.

c The length or height of the LIC PCC is measured from the centerline of the burner to the centerline of the exhaust duct.

d The length or height of the LIC SCC is measured from the centerline of the inlet duct to the centerline of the exhaust duct.

**TOOELE CHEMICAL AGENT DISPOSAL
FACILITY
(TOCDF)**

**SURROGATE TRIAL BURN PLAN
FOR THE
AREA 10 LIQUID INCINERATORS**

APPENDIX D

**AUTOMATIC WASTE FEED CUTOFF TABLES AND OPERATING
CONDITION TARGET VALUE TABLES FOR AREA 10 LIQUID
INCINERATOR**

REVISION 0

January 4, 2010

LIST OF TABLES

Table D-1	ATLIC Liquid Incinerator Automatic Waste Feed Cutoff	D-1
-----------	--	-----

**Table D-1
ATLIC LIQUID INCINERATOR
AUTOMATIC WASTE FEED CUTOFF**

Item Number	Tag Number	Process Data Description ^a	Setpoint ^{bc}
1	807-FI-8130	Waste Feed Rate Greater Than or Equal to	± 325 lb/hr (Surrogate) one-hour rolling average a. TBD based on STB results b. TBD based on STB results
2	822-P1-8110	Venturi Atomizing Air Pressure Less Than	± 35 psig
3	815-T1-8471	Primary Chamber Temperature Less Than	± 2550 °F one-hour rolling average
4	822-P1-8521	Spot Devia Feed Rate Greater Than or Equal to	± 152 lb/hr over one-hour rolling average
5	822-P1-8511	Spot Devia Atomizing Air Pressure Less Than or Equal to	± 35 psig
6	815-T1-8571	Secondary Chamber Temperature Less Than	± 1850 °F one-hour rolling average
7	819-FI-8911	Exhaust Gas Flow Rate (Unit Production Rate) Greater Than or Equal to	± 2500 acfm one-hour rolling average
8	819-P1-8982	Scrubber Turbine Pump Pressure Less Than or Equal to	± 22 psig
9	819-P1-8921	Flow to Scrubber 1 Lower Than or Equal to	± 10 gpm one-hour rolling average
10	819-P1-8922	Flow to Scrubber 1 Lower Than or Equal to	± 10 gpm one-hour rolling average
11	819-P1-8923	Flow to Scrubber 1 Lower Than or Equal to	± 10 gpm one-hour rolling average
12	819-P1-8911	Scrubber 1 Pressure Drop Less Than or Equal to	± 0.5 in. w.c. one-hour rolling average
13	819-P1-8912	Scrubber 2 Pressure Drop Less Than or Equal to	± 0.2 in. w.c. one-hour rolling average
14	819-P1-8913	Scrubber 3 Pressure Drop Less Than or Equal to	± 0.2 in. w.c. one-hour rolling average
15	819-T1-8924	Brine to Venturi Scrubber Flow Less Than or Equal to	± 8 gpm one-hour rolling average
16	819-P1-8915	Venturi Exhaust Gas Pressure Drop Less Than or Equal to	± 12 in. w.c. one-hour rolling average
17	819-P1-8417	Venturi Brine pH Less Than or Equal to	± 7 pH one-hour rolling average
18	819-P1-8417	Venturi Specific Gravity Lower Than or Equal to	± 1.28 SG one-hour rolling average
19	819-FI-8979	Venturi Pump Flow Less Than or Equal to	± 7 gpm
20	819-P1-8922	Scrubber Brine pH Less Than or Equal to	± 7 pH one-hour rolling average
21	819-P1-8983	Brine Specific Gravity Greater Than or Equal to	± 1.28 SG one-hour rolling average
22	819-T1-8911	Bag House Inlet Temperature Greater Than or Equal to	± 210 °F one-hour rolling average
23	819-P1-8936	Bag House Pressure Drop Less Than or Equal to	± 1 in. w.c. one-hour rolling average
24	819-FI-8973	Carbon Injection Feed Weight Less Than or Equal to	± 5 lbs/hr one-hour rolling average
25	819-FI-8940	Carbon Injection Air Flow Less Than or Equal to	± 100
26	819-P1-8941-8942	Carbon Filter Pressure Drop Less Than or Equal to	± 0.5 in. w.c. one-hour rolling average
27	819-T1-8979	Carbon Filter Inlet Temperature Greater Than or Equal to	± 240 °F one-hour rolling average
28	819-VT-8972	Blower Exhaust CO Concentration Greater Than or Equal to	± 161 ppm one-hour rolling average, corrected to 7% O ₂ dry volume ^d
29a	819-AAL-8901	Blower Exhaust CO ₂ Less Than or Equal to	± 3% CO ₂
29b	819-AAL-8901	Blower Exhaust CO ₂ Greater Than or Equal to	± 15% CO ₂

**Table D-1
ATLIC LIQUID INCINERATOR
AUTOMATIC WASTE FEED CUTOFF**

Item Number	Tag Number	Process Data Description ^a	Setpoint ^{b,c}
70a	TEN 708AK	Stack Exhaust GVA Agent Detect Greater Than or Equal to	0.5 SEL ^d
70b	TEN 708BK	Stack Exhaust GVA Agent Detect Greater Than or Equal to	0.5 SEL ^d
70c	TEN 708CK	Stack Exhaust GVA Agent Detect Greater Than or Equal to	0.5 SEL ^d
71a	TEN 709AM	Stack Exhaust Lewisite Agent Detect Greater Than or Equal to	0.1 SEL ^d
71b	TEN 709BL	Stack Exhaust Lewisite Agent Detect Greater Than or Equal to	0.1 SEL ^d
71c	TEN 709CL	Stack Exhaust Lewisite Agent Detect Greater Than or Equal to	0.4 SEL ^d
71d	TEN 709DL	Stack Exhaust Lewisite Agent Detect Greater Than or Equal to	0.4 SEL ^d
71e	TEN 709EL	Stack Exhaust Lewisite Agent Detect Greater Than or Equal to	0.1 SEL ^d
71f	TEN 709FL	Stack Exhaust Lewisite Agent Detect Greater Than or Equal to	0.1 SEL ^d
72	STC 1210R-V111R	Residue Metals Detection Greater Than or Equal to	2.0 % by lb 12 hr twelve hour rolling average
73	STC 1210F-V111F	Solvent/Air Pollution Greater Than or Equal to	2.0 % by lb 12 hr twelve hour rolling average
74	STC 1210R-V111R	Invisible Smoke Visible Concentration Greater Than or Equal to	2.0 % by lb 12 hr twelve hour rolling average
75	STC 1210R-V111R	Fish Grease Detection Greater Than or Equal to	2.0 % by lb 12 hr twelve hour rolling average
76	STC 1210R-V111R	Chlorine Greater Than or Equal to	2.0 % by lb 12 hr twelve hour rolling average

Footnotes:

^aOriginal description used by the control system database.

^bRolling average to give the operator an indication of trends. The rolling period is one minute average for the average value, then a point is calculated. Each time a description from history is obtained at least every 45 seconds.

^cWaste feed cut-offs recorded upon such activation.

^dOne hour rolling average is composed of the 60 most recent one-minute averages. Each one-minute average is composed of the 4 most recent instantaneous CO process variable readings at 15-second intervals.

^eAn Automatic Waste Cutoff occurs if the pyrolyzing AC ATIS-MINCO AGS is not active or if the data at least one unit is sampling the stack.

The alarm setting for on/off for GVA, H2O, and H₂S is 0.012.

TRD: These values will be incorporated prior to the final public period.